In This Issue: War Service Electrical Conventions at Del Monte

JOURNAL OF ELECTRICITY

VOL. 40 NO. 10 SAN FRANCISCO, MAY 15, 1918 PER COPY, 25 CENTS

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JOURNAL OF ELECTRICITY

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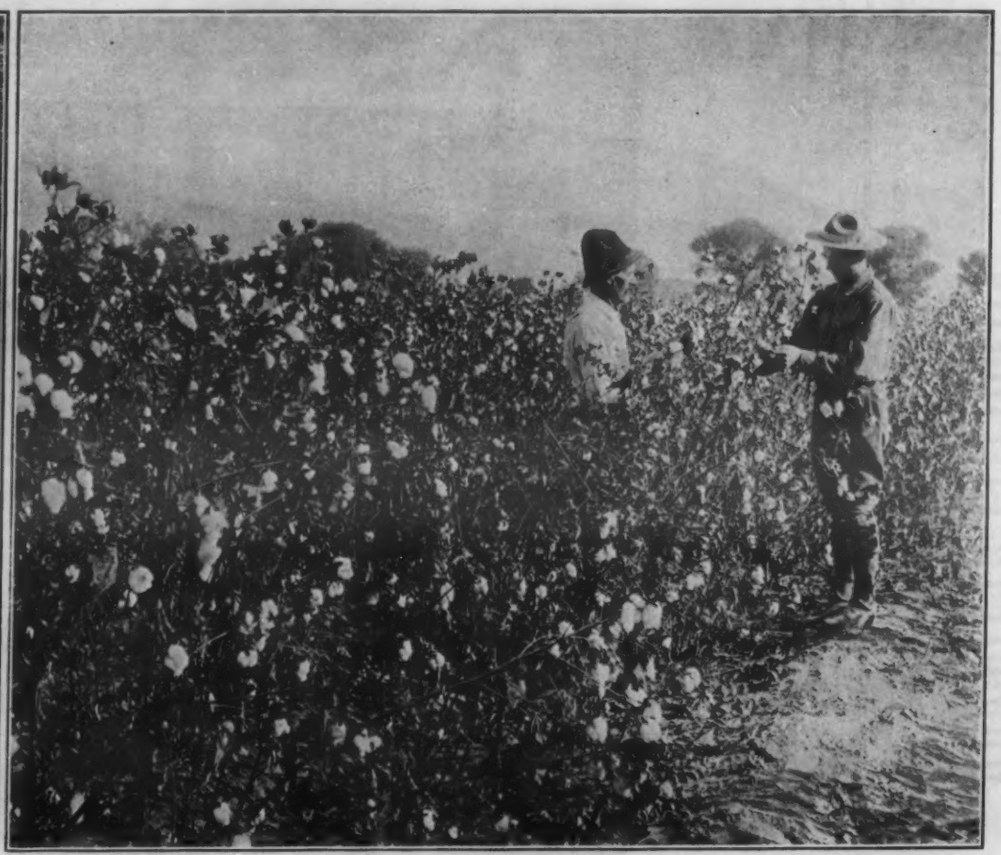

HOW THE UPBUILDING OF THE WEST IS HELPING TO WIN THE WAR—XI

Thirty thousand acres in cotton, which produced a field valued at $5,000,000 during 1917, is a single forceful instance in the West of where hydro-electric energy is aiding in winning the world war. The cotton fields of the Salt River Valley, in Arizona, shown in the illustration, fed by the giant Roosevelt dam—the second largest impounded waters in the world — together with the hydro-electric supply thus made available, beautifully typify the new West and its present service to the nation. The yield in cotton, which is as high as 500 pounds per acre and of excellent quality, points emphatically to the war service of electrical energy in all other agricultural districts of the West, where one commonwealth last year produced through the aid of electrical energy the enormous total of a billion dollars in agricultural products.

MAY 22 1918

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

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THE AMAZING MATHEMATICS OF GOSSIP

FEW seem to realize the enormous propagating power of gossip. Let us for a moment do some simple arithmetic. It is safe to say that 98 per cent of America's hundred million souls talk to at least five different persons a day. It is likewise safe to say that within at least twelve days, 98 per cent of the population can be reached by personal travel. Then it follows, by one person communicating a piece of gossip to five others and the next day each of these five communicating this gossip to five others, and so continuing this process but for twelve days, that almost a quarter of a billion human souls can be influenced—or a population two and one half that of the United States.

While, of course, much of the propagating power of gossip loses itself in conversation with those who have "heard the news," yet in view of the amazing possibilities of its baleful influence, let each loyal citizen resolve to down the gossip that weakens our cause, and in its place spread the win-the-war spirit everywhere.

The Keynote of the Del Monte Conventions

Much had been hoped for at the Del Monte conventions, but few anticipated the wonderful extent to which war service ideals would be crystalized at the various sessions. Some months back, President Wilson announced to the world the fourteen fundamental points necessary for all peoples and nations to agree upon before world peace could become an assured reality. First and foremost among these he emphasized the necessity for open and aboveboard discussion at all times and places.

And so it is not surprising that the keynote of the great Del Monte conventions proved also to be a protest against the closed, secret meeting in the industry, and a plea for the open discussion at all times.

The West has ever proven itself to be the foremost leader in advanced thinking along lines of mutual helpfulness. The open meetings at Del Monte, in which central station manager, representatives of the Railroad Commission, operating engineer, contractor-dealer, jobber and manufacturer vied with each other in expression of how the industry can better serve the nation by building up within itself a fuller, more harmonious working organization, fully justified the best traditions of the West.

The Del Monte conventions will go down in history as a splendid expression of war service ideals in utility life and an emphatic protest against the closed meeting in future affairs of the industry.

In the coming months much is expected of the electrical industry. The whole world thought in its present state of flux is susceptible of molding and casting into channels of activity that will make for a better, more cheerful place in which to live. Is it too much to hope that the wholesome Del Monte conventions may have a part, no matter how small, in this great work?

Some Heavy Cannon Netting Results

The wide publicity that is being given to the very intensive discussion of the necessity for new water power legislation and development that has appeared in recent issues of the Journal of Electricity is beginning to net results.

This editorial matter, reaching as it does practically every phase of national engineering and industrial life, and breathing the potential possibilities of the great water power resources of the nation, from a publication that speaks from a viewpoint of thirty-one years of service to the nation, bears upon its face the conviction of sincerity. The able specialists and public spirited men who have contributed these articles make this array of facts all convincing.

It is gratifying to note that the utility organizations themselves are throughout the West aiding in disseminating this authoritative data.

For further intensive spreading of this discussion, the following constitute some of the more important matter on this important subject that has appeared in the columns of the Journal of Electricity since the first of the year.

Editorials—

The Crisis in the Power Situation—January 1, 1918.
The Journal and Water Power Legislation—January 15, 1918.
After-the-War Value of War Service—February 1, 1918.
The Super Power Stations—March 15, 1918.
Water Power Taxation—April 1, 1918.

Editorial Articles—

Initiative and Effort in Peace and War; by F. G. Baum—January 1, 1918.
Frontispiece—Showing war necessity for new power development—January 15, 1918

Frontispiece—Showing how water power is helping to win the war—February 1, 1918.

War Service of Electrical Energy; by Robert Sibley —February 1, 1918.
(A pictorial review of 25 pages.)

Frontispiece—Showing war value of hydro energy—February 15, 1918.

Front Cover — Showing President Wilson's water power letter—March 15, 1918.

Interconnection and Power Development; by P. M. Downing—March 15, 1918.

Some Reasons Why Water Power Development Has Ceased; by John A. Britton—March 15, 1918.

War Time Public Utility Problems; by Max Thelen —March 15, 1918.

Water Resources of Southern California; by H. A. Barre—April 1, 1918.

Not only the publicity departments of the great utility companies in the West would do well to see to it that this valuable and authoritative data be given an even greater dissemination throughout the length and breadth of the nation, but every man of the electrical industry should exert his individual influence in saying a good word for the movement which means so much for the welfare of our nation and for the future prosperity of the great West.

The Engineering Trades after the War

The British ministry of reconstruction has just published a complete list of the various commissions and committees that have been set up, both within that ministry and within other ministries and departments of the British Government, to deal with questions which will arise at the close of the war.

Readjustments in engineering and commercial affairs will shake the entire world upon conclusion of peace. The great Pan-Pacific area offers perhaps one of the greatest fields of opportunity for future development and in the rehabilitation of world affairs the countries washed by the waters of the Pacific will undoubtedly go ahead by leaps and bounds in commercial and engineering development.

We should at this time prepare, as our British cousins are doing, to meet these new conditions by appointing proper commissions to study these problems, especially those relating to the engineering trades.

Such study might, for instance, include the compiling of a list of the articles suitable for manufacture by those with engineering trade experience or plant, which were either not made in the United States before the war, but were imported, or were made in the United States in small or insufficient quantities, and for which there is likely to be a considerable demand after the war, classified as to whether they are capable of being made by (1) women, (2) men and women, or (3) skilled men; and setting out the industries to which such new manufactures would most suitably be attached; and to make recommendations (a) on the establishment and development of such industries by the transfer of labor, machines, and otherwise; (b) as to how such a transfer could be made, and what organization would be requisite for the purpose, with due regard to securing the co-operation of labor.

There should also be board of trade committees on the coal, electrical engineering, iron and steel, nonferrous metal, and textile trades, and on the shipping and shipbuilding industries, to consider the position of these trades and industries after the war, with special reference to international competition, and to report what measures, if any, are necessary or desirable to safeguard that position.

Such timely foresight in the getting under way of these new investigations would mean an after-the-war preparedness for which the next generation would undoubtedly never cease to bless us.

Impairment of Service

Impairment of hydro-electric service in the West would indeed prove almost a calamity, so interwoven has become the application of electrical energy with the industrial and agricultural activity of this section of the nation.

In order that no permanent set may take place that would impair this service, these utilities must be kept in the same high state of maintenance and operation that has characterized their development thus far.

To accomplish this money must be supplied for needed extensions and able men must be kept in the executive and engineering staffs of these organizations.

Neglect of these two factors—the supply of money for needed up-keep and the supply of able men for operation—has given to the world a sad illustration in the recent events that have been transpiring in Russia.

The latest mail advices from Petrograd on the fuel crisis, according to the London Electric Review, say the scarcity of fuel becomes more felt day by day. The electric lighting stations work intermittently, and unexpected interruptions in the lighting are common occurrences. The publication of newspapers is seriously delayed owing to the shortage of current. A number of business concerns, particularly small ones, experience great difficulties for the same reason, while the street railways are reduced to running short time, and look as if they will stop completely. The town water system is also seriously threatened through fuel scarcity.

The stoppage of the street railway traffic in Petrograd is the result not only of insufficient fuel, but serious damage at the central station. One of the two new large turbines of the station not long ago got out of order, says the Nash Vyek, and it could not be put right by the present tramway board, in which there is not a single experienced engineer. Application had to be made to some private firms, but whether they understood the work is not yet quite clear. The tramways council of management, consisting only of workmen and controllers, are probably beginning to understand that without a scientifically trained staff it will be difficult to run the business. Anyhow, the council is now trying to engage engineers.

Such pitiful forewarnings as these should seem to give striking emphasis to recent utterances by the executive authorities at Washington looking toward supplying the necessary financial backing to see to it that American utilities be kept at their maximum of efficiency in operation and development.

The Intensive Training of Seamen

It is almost beyond comprehension to fully grasp what the giant shipbuilding program now under way in Pacific Coast ports means for the future. Within the next eighteen months some five hundred ships are to be put into the merchant marine service from this section of the nation.

Mere figures of course indicate nothing, and are wholly meaningless until careful analysis is made. In the manning of the new merchant marine the electrical and mechanical engineering professions will be called upon to give yeoman service not only in the present meaning of the word, but in the old English distinction of faithful and loyal service to a cause.

A census of fifteen vessels now plying out of a Pacific Coast port shows that of 500 men 16 per cent are American born, 28 per cent naturalized, and 56 per cent aliens. This is a ghastly state of affairs to look square in the face in these days of necessity.

The Sea Service Bureau of the Recruiting Service of the U. S. Shipping Board have worked out some excellent plans for bettering immediately this unfortunate state of affairs. Nationwide publicity will soon be available which will set forth details of the plans for properly training and employing the thousands upon thousands of American-born men for the new life on the sea under conditions of pay and daily living that should appeal to the American youth.

The men desired are of the draft age and are to be exempt from the draft so long as they are in the merchant marine service. The entire matter is deserving of the most careful consideration of all American citizens, but men of the electrical industry in the West should be giving the matter unusually careful weighing, for the ever increasing electrical applications aboard ship mean an increased responsibility for the proper placing of efficient men.

Growth of Commerce in the Pan-Pacific

Statistics just available from the Department of Commerce at Washington on the growth of commerce in the great Pacific area, are most interesting. For many months past the editorial columns of the Journal of Electricity have called the attention of its readers to the growing possibilities of increasing the commercial and engineering relation of the countries that border the Pacific Ocean. That these relations are growing by leaps and bounds is forcefully seen from a casual glance at comparative statistics for the eight months ending February, 1918, in opposition to those covering the eight month period ending February, 1917.

In the eight month period ending in 1918, imports increased by nearly $300,000,000, amounting to the grand total of $1,841,316,000. Exports, on the other hand, decreased by over $200,000,000.

In brief, these statistics are as follows:

IMPORTS FROM: Grand Divisions—	Eight Months Ended February 1918	1917
Europe	$ 284,094,652	$ 300,055,430
North America	553,583,928	425,504,060
South America	370,517,124	312,496,929
Asia	514,135,374	350,087,126
Oceania	77,858,069	37,194,985
Africa	41,126,943	32,473,447
Total	$1,841,316,090	$1,547,811,977

EXPORTS TO: Grand Divisions—	Eight Months Ended February 1918	1917
Europe	$2,434,317,494	$2,877,556,031
North America	774,609,845	687,599,487
South America	222,255,989	101,417,634
Asia	310,421,570	244,101,320
Oceania	83,919,225	73,687,210
Africa	37,824,104	38,631,864
Total	$3,863,348,227	$4,082,993,546

It is interesting to note that our commercial relations with Canada to the North and Asia in the far East have virtually increased to such gigantic totals as to make the Pan-Pacific area hold practically the balance of trade in the new commercial readjustment due to the present critical times.

Among the countries taking American products, statistics show that the greatest expansion is in the case of Japan, which took nearly a hundred million dollars more of American products than in the corresponding eight months of 1917. The greatest drop, on the other hand, was in the exports to European Russia, which were about two hundred million dollars less.

These figures point conclusively to the growing commercial and engineering possibilities of the West. As to the important part that electrical machinery and apparatus is taking in this new commercial upbuilding, statistics from governmental experts now in the Orient investigating this matter will be available in the columns of the Journal of Electricity within the next six weeks.

Need for Standardization in Outlet Boxes

It has been brought to our attention by several prominent electrical contractor-dealers that it would be a great help to them to have all manufacturers of outlet boxes standardize on the screws used in ears of the boxes. Also it is pointed out that the screws now furnished are so short as to be of no use whatsoever. The best size for use for all purposes would be a one-inch, No. 10, 24-thread, which is a standard machine screw.

The many porcelain receptacles and rosettes now installed by the contractor on outlet boxes makes it necessary to use a longer screw in nearly all cases. At the present time, the manufacturers are using three sizes of screws.

We feel this to be an interesting subject to take up with both the contractor-dealer and the manufacturer, and as a consequence, the Journal of Electricity hereby invites a discussion on this timely problem from all those interested in its solution.

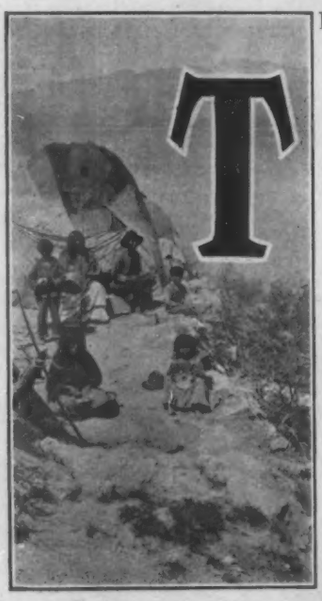
NEW JOURNAL SERVICE: Electricity and its uses for summer months will be featured in the issue of the Journal of Electricity for June 1, 1918. Interesting articles setting forth the application of fan motors, refrigerating machines and cold storage plants, together with other important uses of electrical energy in summer months, will be depicted by experts along each particular line. This is the first instance wherein effective progress in the West in this important phase of the electrical contractor-dealer's activities has been featured in technical journalism.

In the issue of June 15, 1918, the increasing engineering and commercial opportunities in the Far east with reference to America, will be featured for the first time in American technical journalism.

ELECTRICITY IN THE SALT RIVER VALLEY

BY HARRY A. WELSH

(Copper and foodstuffs—essentials in war service—are both dependent upon the electrical energy generated at the Roosevelt Dam in their production. In the irrigation of the great cotton and agricultural belt of the Salt River Valley, the water serves a double purpose, first of providing the power for pumping and then itself bringing life-giving moisture to the desert. Eighteen thousand tons of copper daily and over four and a half million pounds of cotton in a year are no mean contribution to the war needs of the nation—and this record may be counted in large part as a record of electricity's service.—The Editor.)



Roosevelt Lake, where the water is stored

THE importance of electricity in war times in the Salt River Valley may be best understood, perhaps, by the statement that there have been no lightless nights in any of the towns of the Salt River Valley. Neither has any manufacturing enterprise been obliged to close on Mondays because of the necessity of saving fuel, for practically all light and power are derived from the water from the Roosevelt Reservoir.

In response to the question, "How is the electricity generated from the Roosevelt Project being used to help win the war?" Walter R. Elliott, project manager of the Salt River Valley Water Users' Association, said: "Ninety per cent of the energy developed by the water used for irrigating the lands of the Salt River Valley is utilized directly or indirectly in increasing the production of war necessities."

The water as it is released from the great Roosevelt Reservoir, sixty miles above the Salt River Valley, develops 11,000 kilowatts; 8000 kilowatts is transmitted to the Inspiration copper mines at Miami, and 600 kilowatts to the Magma mines at Superior. The balance is transmitted to Phoenix for lifting water for irrigation, for light and for power. In addition to the power developed at the reservoir, there are three power houses located on the canals, which develop a total of 8000 kilowatts. The largest, and also the most beneficial, use of this water is in pumping water to irrigate additional acreages. In this way the water is made to do double duty: First, developing electric power which is transmitted to lands of higher elevation, and there to operate pumps for irrigating more land.

The total amount of land which is thus reclaimed from the desert, and is now producing, is approximately 34,500 acres; this, of course, in addition to the 240,000 acres watered by gravity ditches. It is true that water is developed from other sources to some extent for these lands, but the fact that is of most importance is that this area of 34,500 acres would be, as it was for unnumbered centuries, a desert waste, were it not for the hydro-electric power developed from the Roosevelt Dam.

The Roosevelt Dam, impounding the water of the Salt River and Tonto Creek, was built into the solid rock of the mountains just below the junction of the two above mentioned streams, and about 80 miles from the city of Phoenix.

The dam is situated just at the head of a narrow canyon. Back of the dam, and forming the reservoir site, is a natural basin, an ideal location for the great reservoir. The dam is 284 feet high and 168 feet thick

The Roosevelt Dam was completed February 5, 1911, and dedicated by Theodore Roosevelt on March 18, 1911. Of course, a large portion of the area irrigated from this stored water is reached by gravity ditches, but 34,500 acres of desert land are dependent on electric pumps for their water supply. Some 8000 kilowatts is further transmitted from the power plants at the dam to the great copper mines at Miami to help supply this war necessity for the government.

RAISED ON ELECTRICALLY IRRIGATED LAND

Dates, alfalfa, corn and lettuce, grown on the desert through the stimulus of water. How large a contribution to the food supply of the nation is made by this fruitful country may be judged from the table given below.

at the base, built into the solid bedrock of the stream to a depth of 36 feet, and embedded in the solid mountain walls, on either side.

The reservoir forms a lake 25½ square miles in area, and holds the waters drained from an area of 7500 square miles. It holds water sufficient to water 1,367,305 acres, one foot deep, or enough to furnish a constant supply of water for the 240,000 acres under the irrigation project for a period of three years.

The water has made possible the growing of:

285,030 tons of alfalfa.
13,000 lbs. of alfalfa seed.
4,642 tons of grain, hay.
33,318 cwt. of Indian corn.
5,362 tons of corn, fodder.
28,018 tons of corn, sorghum.
79 tons of corn, broom.
172 tons of cane, sugar.
153,606 cwt. of barley.
53,123 cwt. of wheat.
15,759 cwt. of oats.
4,688,900 lbs. of cotton, long.
5,861 tons of cotton seed.
80,522 crates of oranges, navel.
3,150 crates of oranges, Valencia.
7,506 crates of grapefruit.
464,580 lbs. of olives.
2,046,500 lbs. of apricots.
3,336,760 lbs. of peaches.
118,733 lbs. of pears.
264,750 lbs. of grapes.
76,875 crates of small fruits.
435,862 crates of cantaloupes.
2,217,800 lbs. of watermelons.
29,300 crates of lettuce.
21,375 cwt. of beans.
22,380 cwt. of potatoes, Irish.
8,250 cwt. of potatoes, sweet.

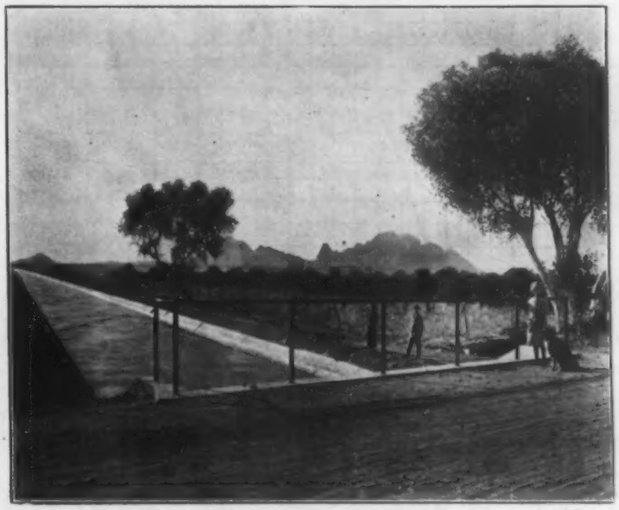
The production of 10,000,000 pounds of butterfat, 40,000 tons of beef, 3000 tons of pork, 600,000 cases of eggs, besides uncounted thousands of pounds of poultry of all kinds.

ADMINISTRATION BUILDING

The Water Users' Association has already let a contract for an additional power plant, and is to extend the present plant to develop power for pumping water to 30,000 more acres of arid land.

The water, too, has made possible the growing of hundreds of home gardens which have added no small amount to the food of the country.

No metal is of more importance in war than copper, and the hydro-electric power developed by the water has made possible the operation of the Inspiration Consolidated Copper Company, one of the largest



CEMENT-LINED CANAL

11,000 kw. is developed at the reservoir and in addition three power houses are located on the canals which develop a total of 8000 kw. The largest use of this power is for irrigation pumping.

producing mines of the state. This mine produces 12,000,000 pounds of copper a month.

The Water Users' Association is planning even greater things for the future. A contract has already been let for an additional power plant which will double the electric energy furnished to the Magma mine. Plans are well under way for extending the present power plant which will develop power for pumping water to 30,000 acres of desert land, adding that much more to the food production of the country.

GIANT MAGNET IN USE TO HANDLE MATERIAL IN SHOPS AT OGDEN

A huge steel maget is being used in the Southern Pacific shops at Ogden for the purpose of loading and unloading scrap at the scrap docks and unloading and handling castings to and from cars about the shop grounds. The magnet is applied to a self-propelling crane equipped with a 40-foot boom. The magnet has a lifting capacity of approximately 44,000 pounds when applied to material such as a slab with a smooth surface.

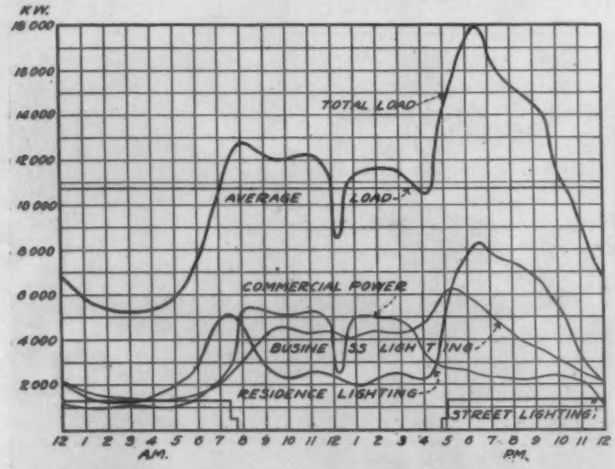
PEAK LOADS UNDER DAYLIGHT SAVING

BY C. A. ANDREWS

(From the data which have already accumulated in regard to the effect of Daylight Saving, it is possible to predict with some accuracy the year's result. The interesting problem, of course, is how the business, the lighting, and the domestic load will overlap under the new arrangement. In this article by a man who is connected with the engineering section of the city lighting department of Seattle, an analysis of the general load into its component factors has been made and these shifted as necessary under the change in time. The result is a very interesting series of curves for comparison.—The Editor.)

The analysis of the load conditions of large metropolitan power systems presents a problem of interest from various viewpoints. In the study of rate making, building up of load, improvement of load factor, the effect of the daylight saving law and other factors, the method of analysis herewith presented may prove to be of value to power producers.

While each case of load study will undoubtedly present its own individual peculiarities, the general principle involved in the accompanying method is capable of rather widespread application. Much desirable research work has been done in connection with individual cases of many different classes of power applications. Load curve forms have been presented for a multitude of classes, each being considered as an individual case, but the aggregate of all these classes that are usually found connected to any large power system offer an interesting field for study.



THE AVERAGE DAILY LOAD UNDER TRUE TIME

The curve types were obtained from instrument readings on feeders devoted exclusively to each class. The proportional load heights were figured from the kilowatt hours sold in each class of business.

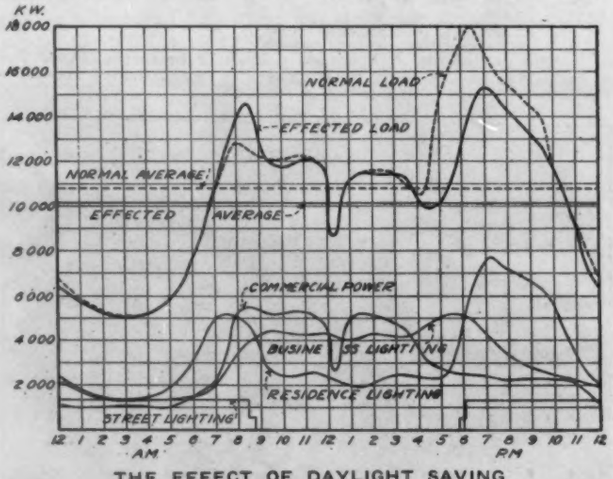
Power consumers may be grouped in classes in many different combinations, but for the purpose of illustration, the load on a power system in a Western city is here divided into the following four factors: Commercial power, which includes, in general, all classes of motor applications; business lighting, including stores, theatres, hotels and office buildings; residence lighting, including electric ranges and other miscellaneous household devices; and street lighting. In this case only the street lighting load curve could be determined directly from instrument readings in the stations, the other three classes of load being supplied, in part, from identical feeders.

A sufficient number of feeders, however, were given over to each single class of consumers, so that at least the curve form of each class was readily determined from station readings by plotting the combined loads on the feeder supplying each kind of load.

For each of the curve forms determined in this manner an average load was then found. The sum of these four averages as thus found would not, of course, be equal to the average for the total load on the system, since the four curve forms represented only a fraction of the total load.

The thing desired, however, was that the sum of these four averages should equal the average of the whole load, and to determine the relative height of each average, and consequently each curve form, so that the four curves, when added, would give the real load curve of the entire system, recourse was had to the total amount of kilowatt hours sold in each class of business, as shown on the readings of customers' meters. The period of time covered by this study was for the month of January, 1918, and the total kilowatt hours sold in each class of business during the month, divided by 744, the number of hours in the month, gave the average load in each class of business, as at customers' meters. Assuming that the total losses between the station distribution buses and the customers' meters to be divided proportionately to the amount of power delivered to each class of consumers, the average load distributed from the buses to each class was assumed to be the same percentage of the total amount distributed as each class average at the customers' meters.

Thus the average load at the buses was divided into four parts, in proportion to the sales in each class, and each part thus found, when divided by its respective average found from the original curve forms, gave a factor by which its respective curve form must be expanded to bring the curve to a true representation of the total load in its class. When this was done and each of the four expanded curves plotted together and added, their sum gave a curve of total load which



THE EFFECT OF DAYLIGHT SAVING

The effect of commencing the day an hour earlier has here been plotted for each class of business and the total daily load compared to that before the application of Daylight Saving.

coincides with the actual average curve for the month with remarkable accuracy.

The fact that a total load curve as calculated in this manner might not exactly coincide with the actual average curve may be due to one or more of several factors, involving accuracy of customers' meters, and the time of their reading, as compared to station meters, correctness of curve form in each class, etc., the latter being the most probable source of error.

The accompanying curve, Fig. 1, shows the total load and its four factors as determined in the manner herein outlined, while Fig. 2 shows the application of the method to the study of the effect of the daylight saving law if applied the year around. In this case, the clocks having been set one hour ahead, the street lighting load and the power load are seen to overlap in the morning, whereas before "spiking the clocks" this did not occur. These two curves would undoubtedly undergo no change in form due to the law and consequently were plotted in exactly the same shape as before, but with the street lighting load shifted to conform to the hours of dark and daylight. The form of the residence and business curves have been slightly altered in this illustration.

The net effect of keeping the clocks an hour ahead throughout the year is seen to produce an improved load factor and a reduction of kilowatt hour output. For the period here illustrated, the average load is decreased from 10,750 kw. to 10,125 kw., the peak is decreased from 18,000 kw. to 15,300 kw., the daily kilowatt-hour output is decreased from 258,000 kwh. to 243,000 kwh., while the load factor increases from 59.7 per cent to 66.6 per cent.

In plotting the individual curve forms as first approximated and totaling this assumed consumption, the resultant curve was found to coincide with the actual average at all hours except between 8 a. m. and 4 p. m. The maximum variation during this time was 7 per cent in excess of the actual average. This was reduced by a slight variation of the individual curve forms.

MARKET FOR SMALL ELECTRIC MOTORS IN INDIA

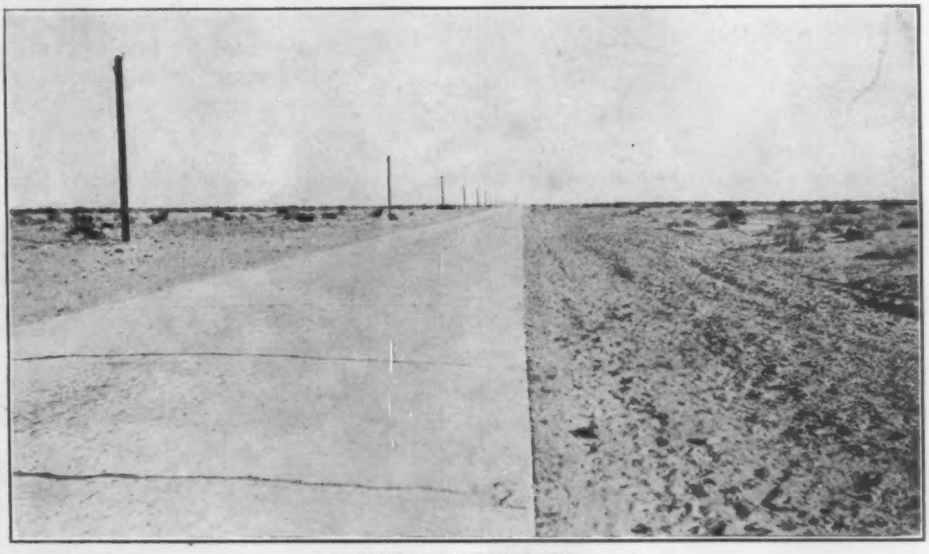
The Indian Textile Journal expresses surprise that no foreign firm has yet thought it worth while to open up in Bombay a demonstration of electric motors for miscellaneous industrial purposes, including small cotton and grist mills, printing presses, elevators, and brass and woodworking machinery. It voices the opinion that the local producers of electric current would be interested and glad to co-operate with such a project, if promoted on the ground. Motors of medium grade and cost would probably be best suited to the market. Hitherto the United States has not had a very large share of the Indian trade in electrical accessories, except in the line of fans, but the war has changed conditions materially and previous sources of supply have been largely cut off.

SAN DIEGO-EL CENTRO TOLL LINE

(This last year of war has witnessed many remarkable feats accomplished by individuals and by companies because the government asked it as a war service. This record of a telephone line built under difficulties over mountains and desert is not the least romantic of the accomplishments. The data is made available through the courtesy of the Pacific Telephone & Telegraph Company.—The Editor.)

The United States government, through Col. W. E. Wilder, in command of the Third District, with headquarters at Los Angeles, recently made a request for a telephone line from San Diego, Cal., to El Centro, Cal., a distance of 123 miles, with stations at Campo and Tecate, where government military camps are located.

A few days later the construction department of the Southern Division had part of the material necessary for the work and the men to do it, on the job. Work was begun at San Diego, with only a small part of the material in sight. The balance of the material, which in all consisted of 3990 poles. 17 tons of copper wire, 500 anchors and a large quantity of miscellaneous material, was secured and shipped to San Diego, Campo, Dixieland and El Centro, from which points it was hauled by motor truck and unloaded as near to the line as it was possible to go by road, which in some



ACROSS THE DESERT

A long stretch of the line was laid across the desert where the sand was so dry that it filled the holes as fast as they were made, and the sun so hot that metal instruments had to be handled with heavy gloves.

places was over two miles away and seldom nearer than 200 feet. This is where the "Missouri thoroughbreds" and burros did their bit, and for many miles the brush was so thick through the mountains that the men had to crawl on their hands and knees and pull the poles and material after them. It was even necessary in some places to cut trails through.

For the first 82 miles out of San Diego the line was built through the mountains, and as it was sometimes impossible to get right of way on property over which it would have been advantageous to pass, for half this distance the line was built through brush as described above. The other half was through barren, rocky country, in 21 miles of which the poles were set in solid rock, after having been lowered down steep and rugged mountain sides and carried up again on the opposite side of a river bed over high hills of rocks to the line where the holes were blasted with dynamite.

At the bottom of the Mountain Springs grade the mountains and desert meet. There is a concrete bridge at this point connecting the mountain road with the concrete road leading over the desert to El Centro. For the next 23 miles the poles were set in sand, although the digging was easier which permitted the use of the pole hole digging machine. Considerable difficulty was experienced in keeping the sand from falling in and filling up the hole before the pole could be set on account of exceptional dryness. These 23 miles of holes were dug by the machine in eight days, but the heat was so intense (averaging 120 degrees) that a single shift of men could work only a few hours at a time and they had to wear heavy leather gloves in order to handle the wires and tools, as they were too hot to be touched with the bare hands.

The sun was so hot that it warped the concrete road in several places, making bumps six inches high.

Just thirty days after the work was commenced, the line was completed into El Centro, making a total of 105 miles of toll line constructed and seven miles of wire strung on existing poles between Seeley and El Centro and 11 miles between La Mesa and San Diego.

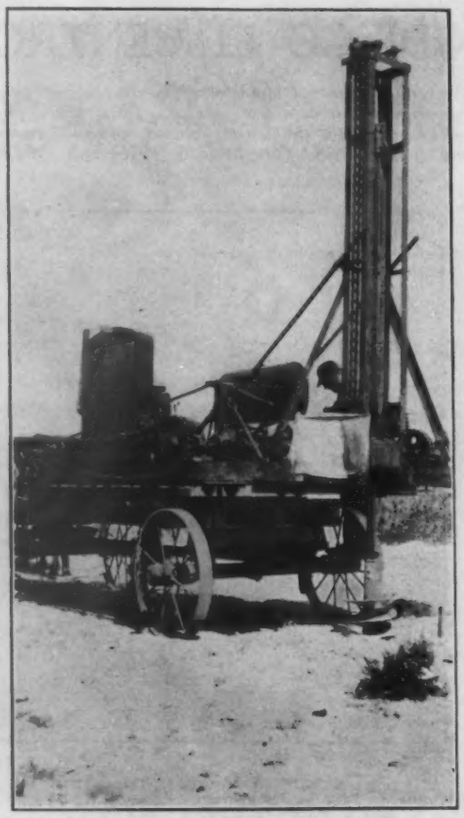
A total of 3990 poles were set, averaging 133 poles each day with two outfits. Heretofore the feat of Captain G. F. Price of the United States Army, when he built a telegraph line from San Diego to Tucson in 1873 in four sections, and setting a total of 93 poles each day, was considered wonderful. The Pacific Telephone & Telegraph Company, with half the number of outfits, set 133 poles each day, which was 40 more poles than set daily by Captain Price.

Captain Price set 17 4x4x18-ft. square poles to the mile, strung 1 wire and averaged 5½ miles a day. The Pacific Telephone & Telegraph Company set 38 poles to the mile, strung 2 wires and averaged 3½ miles a day, using 4x6x20-ft. square poles, also 925 25-ft. and 30-ft. round poles on corners and road crossings. Approximately 500 anchor guys were placed on the line. Notwithstanding the fact that the telephone company built its line according to standard specification, heavy enough to carry a ten-pin arm lead with a present and ultimate capacity of 2 and 10 wires respectively, enough poles were set each day to cover a distance of 7.8 miles, had they been strung out at the rate of 17 to the mile instead of 38, thus actually building 2.3 miles more actual toll line, with half the number of outfits, than Captain Price.

Considering the great difficulties involved in the construction through mountain and desert, and the fact that the work was done well within the estimates for labor and incidentals, it is an achievement that telephone men will do well to emulate.

THROUGH THE MOUNTAINS

For twenty-one miles, the poles had to be set in solid rock. Often the poles had to be carefully lowered down steep mountain sides and then carried up again on the opposite side of some rocky river bed.



POLE-HOLE DIGGING MACHINE

In many places through the mountains the holes had to be blasted with dynamite, but wherever possible the drill was used.

RECENT ADVANCES IN WESTERN WATER LAW

(The lack of clearly worded and comprehensive laws covering questions of water rights has been one of the most difficult and discouraging features of water power and irrigation development in the West. The Water Code of Oregon, adopted in 1909, is generally looked upon as one of the most progressive steps which has yet been taken to remedy that situation. A survey of present conditions there, with a summary of the laws which govern riparian rights in that state, is here given by the Oregon state engineer, as presented recently before the Idaho Irrigation Congress.—The Editor.)

THE OREGON SYSTEM

BY JOHN H. LEWIS

It is generally conceded that certain fundamental information must be gathered at public expense and made available as a basis for the sound development of the public water resources in the arid and semi-arid states of the West. Here land is of little value without water. The well-known system of public land surveys, and of land titles, is of relatively small value in the planning for financing a large irrigation or water power project in comparison with the more difficult water right and water supply problems.

No longer will the capitalist rely upon water supply estimates based upon precipitation records. He must have actual measurements of stream flow in the vicinity of the proposed diversions. If a large project is in contemplation and the water supply is limited, daily stream flow records extending over one to ten years must be available. If these records are not available, capital will as a rule go to those states having such records. In addition to this, reliable information must be had as to the extent of prior rights on the stream, so as to determine the amount of surplus water which is available for the new project. Here again the tendency will be for capital to go to the state having definite water right records.

Even with this information furnished at public expense, it is still a matter of considerable expense to prepare plans, and estimates of cost for a large project so that the cost per acre, or horsepower for development, may be known and its feasibility determined. Few promoters can finance such an investigation and then it is undertaken only in the hope of making enormous profits. Oregon has gone beyond most states in preparing plans and estimates of cost for the benefit of land owners and we should in the near future, see the development of many of our large projects. The state has in a measure taken the place of the promoter, so that the people residing on the land may be saved from heavy promotion expenses. Where there are several alternate schemes for the development of a vally, it is found that the people place considerable confidence in these reports.

Oregon's Program

The State of Oregan has laid a solid foundation for the development of its water resources during the twelve years since the creation of the office of state engineer.

During this period the state and the U. S. Geographical Survey have been co-operating upon the dollar for dollar basis in determining the amount and seasonal fluctuation of the water in our streams. All water supply information has been summarized and published for convenient reference by those interested.

We have also expended a considerable sum of money in determining how much of the public water supply has already been put to beneficial use, so that the amount of surplus water may be known. These records can be readily consulted at the central office at Salem.

We have expended $65,000 and the U. S. Reclamation Service has expended about $100,000 in co-operation with us in the preparation of plans and estimates of cost for the irrigation of twelve large projects embracing 795,000 acres, at an estimated cost of $41,794,000 dollars, and for the development of about two million horsepower. These reports are furnished to owners of land under the various projects. They form a reliable basis for organizing for construction.

Laws have been provided, whereby definite rights to unappropriated waters can be initiated, and these rights protected during the construction period.

Oregon's Water Code

In 1909, Oregon adopted a water code, which has since been accepted as a model for similar legislation in a number of Western states. This law has been interpreted by various state and federal courts, and its constitutionality upheld by the Supreme Court of the United States.

The water code declares all waters within the state from all sources of supply to be property of the public. Definite administrative machinery is provided to regulate the use of this property in the interest of the public, and for the protection of vested rights. This regulation is possible under the police power of the state.

A board of which the state engineer is chairman was created to have charge of this property.

It is the duty of this board:

(1) To ascertain and record all rights to use of this public property which had become vested prior to the adoption of the law.

(2) To grant rights, for beneficial use in the state's unappropriated waters, to those who may initiate rights subsequent to the adoption of this law.

(3) To protect all recorded rights to the use of public waters by regulating diversions from streams.

This law has given general satisfaction to the irrigation and water power interests, also to promoters of new enterprises, and the public generally. Water power interests and promoters are pleased, for it protects existing rights, and grants ample protection while constructing new projects and putting the water to beneficial use.

The public is generally satisfied with the law, for it has added value to existing rights through security of title, and freedom from long and expensive litigation. It has stimulated development. It has discour-

aged the barter and sale of water by speculators apart from the use, and has prevented the monopolization of unused waters by legal obstructionists, or through the purchase of worthless lands bordering the streams. It has also given particular satisfaction to those interested in the highest development of the state, for the reason that there is a special tribunal to represent the state in all water right determinations. No longer will the solemn spectacle be endured of a court being compelled to divide up public streams among several litigants who happen to be parties to a suit without regard to the rights of others on the same stream, or the rights of prospective appropriators. Nor will the new appropriator be permitted to claim an unreasonable amount of such surplus water. There is now a public official with power to limit his appropriation to an amount which he can reasonably put to beneficial use, or deny the application in whole or in part, if it conflicts with existing rights, or is a menace to the safety or the welfare of the public. A state water department to dispose of state waters is more necessary for states in the arid West, than state land departments.

Machinery of Courts Inadequate

Having neglected our water right records in the past, it becomes necessary to create special machinery, and a new procedure for determining and recording old water rights. When started, this record should be completed as rapidly as possible.

The rules of pleading and of evidence in court practice in general produce biased testimony, leaving the court to guess at the truth. This practice leads to great expense, delay, and confusion. Take for example the Snake River adjudications in Idaho. These, I am informed, have been in the courts for years. Occasionally the case is opened up, for a few weeks, and new testimony offered. By this time maps upon which the adjudication was based are necessarily obsolete, and it would doubtless prove more economical to abandon the proceeding and start all over again under a new procedure, with a single expert head, so you can hold him responsible for results. It is merely a guess to say that no finite mind can analyze and digest the mass of testimony which has accumulated in these cases so as to do justice to all under present conditions. It is believed that a single executive officer as provided in the recent Washington law, is preferable to the commission plan as had in Oregon.

Simple, inexpensive maps are made in Oregon showing the location of ditches, irrigated areas, power houses, etc. These maps are submitted at the hearings and are almost invariably accepted as correct by the water users. Their claims are presented on simple blank forms which are carefully scrutinized by the superintendent to determine their accuracy before acceptance. These claims are later submitted to the inspection of all water users and contents permitted. In this way an adjudication is primarily a clerical job tabulating the claims as presented. It is unnecessary to produce preponderance of biased testimony to prove the facts which can be ascertained by a disinterested survey. The few contests which are tried out in the usual way, as a rule affect only a small percentage of the claimants.

These proceedings are nine-tenths clerical, administrative and engineering, and about one-tenth judicial. The courts in Oregon welcomed the creation of the new tribunal to take over this work. They have upheld the law in every case so far presented.

Court Approved

The constitutionality of these administrative water right determinations came before the Supreme Court of the United States for the first time in March, 1916, in the Oregon case of Pacific Live Stock Co. vs. Lewis (241 U. S. 440).

The highest tribunal in the land has placed the stamp of its approval on our procedure for the determination of water rights, and said in unmistakable terms that this procedure deprives no man of his property without just compensation, denies to no man the equal protection of the law, and violates in no way the fourteenth amendment to the Federal Constitution guaranteeing such protection.

The court has said in referring to the water code: "It adopts a comprehensive scheme for securing an economical, orderly and equitable distribution of the waters to those entitled to their use."

Four important points were decided: First, the district court was upheld in declining to take jurisdiction over the proceedings upon application of one of California's powerful cattle corporations. One of the grounds for refusing to assume jurisdiction was that the controversy was not separble, and it may safely be assumed that at no stage of the proceeding, whether before the board or the court, can it be transferred to the federal court.

Second, the Supreme Court followed the state court's interpretation of the statute relative to the character of the proceedings before the board, declaring them to be administrative and not judicial.

Third, the maps and data collected by the state engineer, it was held, could properly be considered as evidence by the board and the courts, though the same was not sworn to. Such data have the weight of prima facie evidence and are not conclusive.

Fourth, in view of the fact that it was necessary that some plan be provided for the distribution of the water during the pendency of the proceedings before the court, it was deemed proper that the board's order of determination be enforceable unless suspended by a stay bond as provided in the act. It was also held that the fees collected were reasonable and the manner of assessment equitable. A perusal of the opinion must leave the impression that the court looked with favor upon the whole proceeding.

The Oregon water code is undoubtedly the most completely adjudicated water code in the United States. Practically every important phase of the law has been passed upon either by the Supreme Court of the State of Oregon or the Supreme Court of the United States. Owing to the many interstate streams, there has been a tendency for many years to secure as far as possible, uniform water laws in the Western States. The Supreme Court decision in this case forms the basis for such uniform laws, and it is to be hoped that any statutes along this line which are enacted in the future will follow these well established principles, thus facilitating the adjustment of interstate disputes through uniformity of state laws.

FUEL OIL AND STEAM ENGINEERING

BY ROBERT SIBLEY AND CHAS. H. DELANY

(Where does all the heat go in one pound of fuel oil used in steam generation? This is a vital question in fuel economy, as upon the definite location of the heat wastes depends the ability of the engineer to increase the power plant economy. In the following discussion the burning of one pound of fuel oil, holding in suspension 19,450 Btu. of heat energy, is traced in its journey through the furnace, and the necessary formulas for computing the heat balance are established.—The Editor.)

THE HEAT BALANCE IN FUEL OIL PRACTICE

Let us now examine the various channels of heat transfer going on in the boiler and see how the details of the heat balance are set forth. In this discussion H_o will represent the calorific value of one pound of fuel oil under test.

(a) a. **The total heat absorbed by the boiler.** As has been previously shown, the equivalent evaporation of a boiler per pound of oil represents the number of pounds of water which would be evaporated into steam per pound of oil if the water was at 212° F. and under atmospheric pressure, and this water then converted into dry saturated steam at the same temperature and pressure. It is self-evident then that the total heat absorbed by the boiler for each pound of oil burned in the furnace is equal to the equivalent evaporation multiplied by the heat necessary to convert one pound of water into steam under conditions just mentioned. This quantity of heat has been found by Marks and Davis to be 970.4 B. t. u., as set forth in previous discussions. Representing this in a formula the total heat H_t absorbed by the boiler per pound of fuel is

$$H_t = M_e \times L_e \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

in which H_t is the total heat absorbed by the boiler per pound of dry fuel, M_e the equivalent evaporation per pound of oil, and L_e the latent heat of evaporation at 212° F., which is 970.4 B. t. u. Hence, if the equivalent evaporation of a boiler is found by test to be 28,225 pounds of water per hour, and if the measurement of oil shows that 1872 pounds of oil have been consumed

$$M_e = \frac{28225}{1872}$$

$$\therefore H_t = \frac{28225}{1872} \times 970.4 = 14639$$

b. **Heat absorbed by boiler for atomization.** In ordinary practice of fuel oil consumption, there are three methods of atomization employed. In the larger power plants the use of steam for atomization purposes, or in other words, the diverting of steam from the boiler into the furnace in order to atomize the oils, seems to have by far the preference. It is proposed to alter the rules of the American Society of Mechanical Engineers so that the heat represented by the steam used in atomization must be subtracted from the total heat absorbed by the boiler in order to compute the net evaporative power of the boiler. Hence to make this computation we must know the number of pounds of steam used in atomization per pound of oil burned. Methods of arriving at this result have been described in a previous chapter.

Calling M_s the pounds of steam used in atomization per pound of fuel burned, H_s the total heat per pound of steam so used, and h_1 the heat in the entering feed water, and H_a the heat absorbed by the boiler per pound of fuel in atomizing the oil, it is evident that

$$H_a = M_s (H_s - h_1) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Thus it has been found in the test under description that .530 pounds of steam were utilized in atomization per pound of oil. Saturated steam at a temperature of 381.9° was used. From the steam tables such steam is found to have a total heat of 1198.08 B. t. u. The entering feed water was at a temperature of 169.1° F. and has a heat of liquid amounting to 136.87 B. t. u. We find by substitution that the heat absorbed in atomizing the oil is computed as follows:

$$H_a = .530\ (1198.98 - 136.87) = 562.44 \text{ B. t. u.}$$

c. **Net heat absorbed by boiler for power generation.** Since then the heat utilized in atomization must be subtracted from the total heat absorbed by the boiler, to ascertain the net heat H_n absorbed by the boiler for power generation, we have the following formula:

$$H_n = H_t - H_a \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$\therefore H_n = 14639 - 562.44 = 14076.56 \text{ B. t. u.}$$

(b) **Loss due to water in the fuel.**

All fuels contain a certain amount of moisture. It is evident that since it requires considerable heat to convert this moisture into steam and then to send it forth from the chimney in a superheated condition, a definite loss is thereby sustained in boiler operation. This moisture must first be raised to 212° F., then converted into steam, and then heated to the temperature of the outgoing chimney gases. If we let M_w be the proportion by weight of moisture in the one pound of fuel, t_o the temperature of the oil entering the burner, t_g the temperature of the escaping gases, and H_m the loss due to moisture in the fuel per pound of fuel burned, we may write at once an equation representing this loss.

Thus

$$H_m = M_w\ [212 - t_o + 970.4 + .47\ (t_g - 212)] \ldots . (4)$$

The reasons for this formula are seen by inspection. To raise each pound of moisture from t_o to 212° F. would require as many B. t. u. as the raise in temperature, in other words (212—t_o) B. t. u. Again, to evaporate each pound would require 970.4 B. t. u., and as .47 of a B.t.u. are required to superheat one pound of steam one degree in temperature at atmospheric pressure, each pound of steam superheated to the temperatur of the outgoing chimney gases would require .47

($t_g - 212$) B. t. u. Therefore, the total heat required for M_w pounds would be as indicated in the formula above by summing up these separate components.

Thus in the test under consideration, let us assume that the fuel contains 1 per cent of moisture; that its entering temperature is 96° F., and that the temperature of the escaping gases is 400° F. Hence

$$H_m = .01[212 - 96 + 970.4 + .47\ (400-212)] = 11.67 \text{ B. t. u.}$$

(c) **Loss due to water formed by burning hydrogen.**

In the chapter on chimney gas analysis, it was seen that the Orsat Apparatus is so constructed that the vapor or superheated steam formed by the burning of the hydrogen content in the fuel is condensed into water upon entering the burette; hence the Orsat analysis indicates only dry flue gases and takes no account of the percentage of steam actually present in these gases. It is seen then that the moisture formed by the burning of hydrogen must also create a loss as it journeys upward through the boiler. Assuming H_h to be the heat lost due to the moisture formed by the burning of hydrogen by following identically similar processes of reasoning just employed in the considerations of the loss due to the moisture in the fuel, we find that each pound of moisture formed by the burning of hydrogen requires

$$[212 - t_o + 970.4 + .47\ (t_g - 212)] \text{ B. t. u.}$$

From the principles of chemistry each pound of hydrogen combines with 8 pounds of oxygen, thereby forming 9 pounds of water or steam. This relationship gives us a ready means of computing the weight of water vapor formed by the burning of hydrogen, although the Orsat analysis failed to do so. Assuming M_h to be the proportion by weight of hydrogen per pound of fuel oil burned, we have

$$H_h = 9M_h\ [212 - t_o + 970.4 + .47\ (t_g - 212)] \quad (5)$$

By referring to the test data, we find that the fuel analysis shows .11 pounds of hydrogen per pound of fuel, that the temperature of entering air is 84° and the temperature of the escaping gases 400°, therefore

$$H_h = 9 \times .11\ [212 - 84 + 970.4 + .47\ (400-212)] = 1166.97 \text{ B. t. u.}$$

(d) **Loss due to heat carried away by dry gases.**

From the Orsat analysis, by means of well-known standard formulas, the pounds of dry gas passing up the chimney per pound of fuel burned may be easily computed by means of several different formulas. It is found by experiment that it requires .24 B. t. u. to raise one pound of chimney gas one degree in temperature. Hence if M_g be the pounds of dry chimney gas per pound of fuel, the total heat wasted H_g in raising the temperature of these dry gases is seen to be

$$H_g = .24\ (t_g - t_a)\ M_g \quad (6)$$

In this particular instance, let us assume that by the application of our formula we find that 19.83 pounds of dry chimney gas are formed per pound of fuel burned; that the temperature of the entering air is 84.1°, and that of the outgoing chimney gases 400°. Hence

$$H_g = .24\ (400 - 84)\ 19.83 = 1503.91 \text{ B. t. u.}$$

(e) **Loss due to carbon monoxide.**

In the burning of every pound of carbon to carbon dioxide, 14,600 B. t. u. are liberated. When the carbon is not completely burned but passes up the chimney in the form of carbon monoxide only 4450 B. t. u. per pound of carbon so burned are liberated. Hence whenever carbon monoxide appears in the gas analysis it is evident that a definite loss is being sustained due to this incomplete combustion of the carbon.

For every pound of carbon which passes up the chimney as carbon monoxide, a net loss of 10,150 B. t. u. are thus uselessly thrown away. Let us assume that one pound of carbon volumetrically produces V_1 units by volume of carbon dioxide and V_3 units by volume of carbon monoxide. If this is true it is evident that in every pound of carbon so burned $\frac{V_3}{V_1 + V_3}$ pounds are converted into carbon monoxide, which represents a loss of 10,150 B. t. u. per pound. Hence if there are C units of carbon by weight in each pound of the fuel, the formula to be applied to ascertain the loss due to incomplete combustion H_c is

$$H_c = C\frac{V_3}{V_1 + V_3} \times 10{,}150 \quad (7)$$

In the particular case cited above the fuel has .86 proportions by weight of carbon and .01 proportions by volume go out of the chimney in the form of carbon monoxide and .0979 proportions by volume in the form of carbon dioxide. Then the total loss is evidently

$$H_c = .86\ \frac{10150 \times .01}{.0979 + .01} = 801.82 \text{ B. t. u.}$$

(f) a. **Loss due to evaporating steam for atomization.**

By referring back to (a) b in this discussion, we find that the loss due to evaporating steam used in atomization is represented by the formula

$$H_s = M_s\ (H_s - h_1) \quad (8)$$

and in the particular instance in question it is 56.44 B. t. u. per pound of fuel burned. Where the steam used in atomization is brought from an outside source, it would, of course, be necessary to neglect the correction made under (a) b, although the quantity under this heading must still be taken into account.

b. **Loss due to superheating steam used for atomization.**

If the steam has been injected into the furnace in atomization, it is clearly evident that for every pound so injected, .47 of a B. t. u. are required in superheating it to the temperature of the outgoing chimney gases. Hence the loss so sustained is seen at once to be computed from the formula:

$$H_{ss} = .47\ M_s\ (t_g - t_s) \quad (9)$$

in which H_{ss} is the loss due to superheating steam due to atomization per pound of fuel burned; M_s is the proportion by weight of steam used in atomization per pound of oil; t_g the temperature of escaping flue gas; and t_s the temperature of steam used in atomization.

Since we have found that .53 pound of steam were used per pound of oil in atomization and the temperature of the outgoing chimney gases was 400°, and that of the inlet temperature of the steam 381.9°, we see at once that

$$H_{sa} = .47 \times .53\ (400—381.9) = 4.51 \text{ B. t. u. per pound of oil burned.}$$

c. **Total loss in atomization.** If now the steam supply in atomization is taken from the boiler under test, or even brought from a separate supply, it is clear that the total loss so sustained is the sum of H_a and H_{sa}. Hence the total loss H_{ta} in atomization is

$$H_{ta} = H_a + H_{sa} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (10)$$

In the case at issue then,

$$H_{ta} = 562.44 + 4.51 = 566.95 \text{ B. t. u.}$$

(g) **Loss due to moisture in entering air.**

All air drawn into a furnace holds in suspension a certain amount of moisture. In previous instances of moisture entering the flue gas it is seen that a loss is sustained in superheating this moisture content to the temperature of the outgoing chimney gases. Let M_a be the pounds of air that enter the furnace per pound of fuel burned, and let K be the proportion by weight of moisture in this entering air, then the loss in heat units H_{ma} due to this moisture may be expressed at once by the formula

$$H_{ma} = .47\ M_a K\ (t_g - t_a) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ (11)$$

In the illustration cited in this case it was found that there were 22.82 pounds of chimney gas formed, which means that 21.82 pounds of air were drawn into the furnace to burn one pound of fuel oil; that the entering moisture represented .75 per cent of the entering air which found its way into the furnace at a temperature of 84° and escaped from the chimney at a temperature of 400°.

Therefore

$$H_{ma} = .47\ (21.82) \times .0075\ (400—84) = 23.18 \text{ B.t.u.}$$

(h) **Stray losses.**

In order to make a perfect balance between all of of the various factors entering a heat balance, the residual heat of each pound of oil not otherwise accounted for is thrown into a column headed "Stray Losses." It is clearly evident that this loss is equal to the calorific value of the fuel per pound less the sum of all the heat accounted for in the various columns cited above. Hence if H_s represents the stray losses per pound of fuel, and H_o the calorific value of one pound of fuel oil under test, we may write the formula as follows:

$$H_s = H_o - (H_a + H_m + H_h + H_g + H_c + H_{ta} + H_{ma}) \quad \ldots (12)$$

and in the case at issue by summarizing the columns we find this to be 18151.06 B. t. u.

$$\therefore H_s = 19450 - 18151.06 = 1298.94 \text{ B. t. u.}$$

(i) **Total Calorific Value or Summary.**

We are now in a position to summarize the complete heat balance. The various items just discussed will be seen to be represented both in B. t. u. per pound and in percentages, as follows:

Summary for Heat Balance

		——Losses—— in B. t. u.	%	Heat Available
Total B. t. u. in 1 pound water free oil..				19450
(a) a. In total heat absorbed by boiler	14639.00			
b. Heat absorbed for atomization	562.44			
c. Net heat absorbed for power		14076.56	72.37	
(b) Loss due to moisture in fuel		11.67	.06	
(c) Loss due to moisture of burning H		1166.97	6.00	
(d) Loss due to heat carried away by gases		1503.91	7.73	
(e) Loss due to incomplete combustion of C.		801.82	4.12	
(f) a. Loss due to evaporation of steam for atomization	562.44			
b. Loss due to superheating of steam by atomization	4.51			
c. Total loss due to atomization		566.95	2.92	
(g) Loss due to moisture of entering air		23.18	.12	
(h) Stray losses		1298.94	6.68	
		19450.00	100.00	19450

The Net Boiler Efficiency.—In fuel oil central station practice, due to the fact that a portion of the steam generated in the boiler is used for atomization, we need further definition for true boiler efficiency than the notation set forth in the Rules for Boiler Tests advised by the Power Test Committee of the American Society of Mechanical Engineers. The net boiler efficiency B_{ne} for the boiler will be considered as that resulting from taking the ratio of the heat H_n represented in the useful steam evaporated by the boiler per pound of oil fired to the total heat H_o given out by each pound of oil burned. Thus

$$B_{ne} = \frac{H_n}{H_o} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ (13)$$

In the data set forth in the heat balance just computed we find then that

$$B_{ne} = \frac{14076.56}{19450} = 72.37\%$$

The data from which the heat balance and boiler efficiency illustration was computed in this chapter is summarized as follows:

Summary of Data Used

Calorific value of dry fuel oil per pound	19,450 B. t. u.
Equivalent evaporation of water per hour	28,225 lb.
Consumption of dry fuel oil per hour	1 872 lb.
Steam used in atomization per lb. of dry fuel oil	.520 lb.
Temp. of saturated steam used in atomization	381.9° F.
Temp. of feed water	169.1° F.
Per cent of moisture in fuel oil	1.0%
Temp. of entering fuel oil	96° F.
Temp. of flue gases	400° F.
Hydrogen content of fuel	11.0%
Carbon content of fuel	86.%
Temp. of entering air	84° F.
Weight of dry chimney gases per lb. of dry fuel	19.83 lb.
Weight of entering air per lb. of dry fuel oil	21.82 lb.
Carbon dioxide in flue gas	9.79%
Carbon monoxide in flue gas	1.00%
Moisture of entering air from boiler room	.75%

BUSINESS BUILDING
SELLING IDEAS
DISPLAY

WITH THE ELECTRICAL CONTRACTOR AND DEALER

CONSTRUCTION KINKS
COST KEEPING
ESTIMATING

AN ELECTRICAL RED CROSS DANCE

BY F. D. WEBER

(An electrical dance which was made possible by the electrical unions, contractor-dealers and power companies of Portland, and from which 100 per cent of the receipts were turned over to the Red Cross, is a record worth duplicating. The beautiful electrical effects of the decorations, as well as a record of the service so generously presented by the electrical workers, are given in the interesting article which follows. The author is chief inspector of the electrical division of the Oregon Equitable Underwriters' Bureau.—The Editor.)

On the nights of April 4, 5 and 6, the Public Auditorium, Portland, Oregon, blazed forth in a magnificent display of patriotic colors for a series of three dances for the benefit of the Red Cross.

This wonderful electrical display was made possible and accomplished by the three local unions of the International Brotherhood of Electrical Workers. The unions donating their time were: Union No. 125, Linemen's Union; Union No. 44A, Telephone Girls' Union; and Union No. 48, Inside Workers' Union.

Through the willing co-operation of the Electrical Contractors' Association, the county of Multnomah, the city of Portland, and various business interests of Portland, the necessary materials were procured.

The Portland Railway, Light & Power Company furnished the power free of charge, and also the Northwestern Electric Company, the Pacific Telephone & Telegraph Company, and Home Telephone & Telegraph Company, actively assisted.

Mr. J. C. Caine was general chairman of the committee on arrangements, while W. H. Pickering, electrician for Multnomah county, and V. H. Haybarker, electrician for The Oregonian, were directly in charge of the electrical decorations. The decorations consisted of the following:

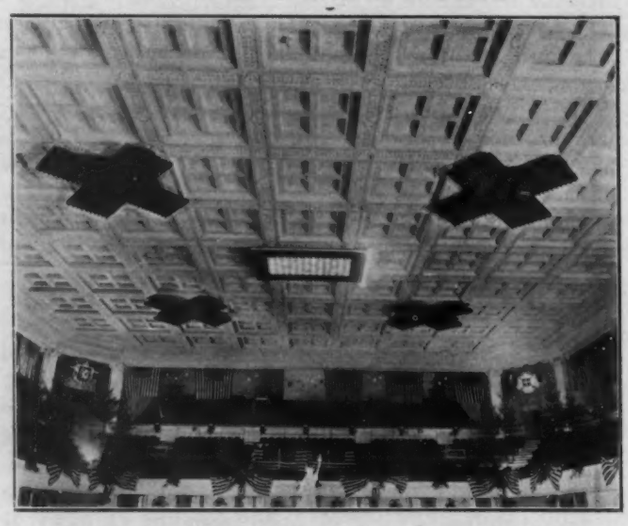
The general color scheme was red, white and blue, the interior finish of the Auditorium being white. On Third street, the main approach to the Auditorium, there were erected red, white and blue streamers, supported on the trolley span wires.

Four red crosses of 500 16-candlepower lamps each, with the lamps two in series, and a service flag of 600 16-candlepower lamps, with the lamps two in series, also, were installed on the ceiling of the main auditorium to replace the large cluster lighting fixtures. At various locations around the Auditorium there were placed illuminated coats-of-arms of the principal allied nations; these were also in colored lights. Set about the balcony, there were 35 300-watt special lensed floodlights which were directed on the ornamental ceiling. The color scheme here, too, was red and blue, which produced a brilliant border completely around the ceiling.

Located between the flags on the balcony there were 48 "R. I." pendants.

Spaced uniformly on the two sides and back of the Auditorium, illuminated block letters in colors were hung, which read, "It's Your Flag." These letters also served as a meeting place for various groups during the evening.

At various points on the dance floor there were twelve colonial pillars erected with glass globes on the top containing a 4-candlepower lamp, with red and blue lamps in alternate pillars, the glass globe being surrounded by three 4-candlepower lamps in colors.



RED CROSSES AND SERVICE FLAGS

The cost of decorations and illumination would have amounted to thousands of dollars—but time and material was donated and 100 per cent of the receipts given to the Red Cross.

In the center of the stage, another red cross was hung, consisting of 200 16-candlepower lamps, two in series.

The stage border lights were also used for color effects.

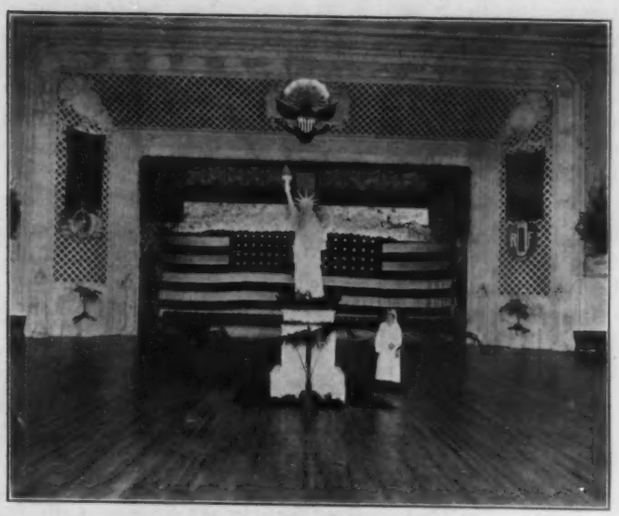
In the center of the dance floor, a large statue of Liberty was erected. Her torch was amber colored and around her feet were red and blue lights.

Throughout the foyer and wings of the Auditorium all the white lamps in the fixtures were changed to red and blue.

Besides the electrical effects, about 150 flags were used and a large drayload of fir evergreens. During the dances the girls of the Telephone Union appeared in the uniform of the Red Cross nurse, making a very impressive appearance.

In order to have a dance floor of 10,000 square feet available, it was necessary to take out the opera seats and put in the portable dance floor. Therefore, with all the labor necessary for the electrical decorations and other details—if the materials had had to be purchased—the cost of this entertainment would have been in the neighborhod of $10,000. All this labor,

however, was donated by the electrical unions, and principally performed at night.



THE OTHER END OF THE HALL

The decorations were very beautiful and showed what might be done with electric lights, for the benefit of those who may have community gatherings to decorate for in the future.

This therefore serves as a tribute to the patriotic spirit of these unions and the other organizations who aided them in their magnificent service.

The box office receipts of $3500—one hundred per cent—were donated to the Red Cross.

RECENT ORDINANCES FOR CONTRACTING WORK IN SAN FRANCISCO

(The following ordinances represent rulings recently made by the Department of Electricity of San Francisco. In the light of practice as permitted elsewhere, these regulations have particular interest.—The Editor.)

In order to properly support fixtures as required by Rule 30, National Electrical Code, the following methods shall be observed in order to obtain this department's approval certificate:

1. Fixtures, both wall and ceiling on new work, shall be supported from the outlet box by means of studs or by metal straps fastened to studs or lugs in the boxes. Special fixtures of a type which cannot be supported except by wood screws may be so installed by special permission.

2. Machine screws shall be used to fasten fixtures to straps to permit inspection of finished work.

3. On old work (that is, fished-in jobs), brackets may be supported by four wood screws of proper length screwed to laths or by metal straps screwed to laths with fixtures attached to straps by machine screws, or by wooden base block (not less than ¾ inch thick) securely screwed to lathing.

4. In all work, flanges, chain pendants, bowls, showers, and similar types of fixtures shall be supported from outlet box by studs or by metal straps fastened to studs or lugs in outlet box.

5. Pans of large diameter may have wood screws fastened to laths in outer edge for the purpose of keeping edge of pan close to ceiling, but not for the support of its weight.

6. All wires for bracket outlets in fished-in jobs shall be brought out between laths, cutting out as little lath as possible and not by boring holes through the lath. Plates shall be securely fastened to the uncut or unbroken laths by wood screws of proper length or by toggle bolts.

Ordinance No. 2582, Section "D," provides that "No current shall be turned into such installation until certificate be issued."

In order to rigidly enforce this section of the ordinance, this department will hereafter require that the preliminary permit issued for the work shall be conspicuously posted at the meter-board and there maintained through the entire period in which construction work is being done. Upon the completion and approval of the installation, a white tag will be affixed by the inspector to this permit, authorizing power companies to install meters.

Beginning April 15, 1918, no meters will be set by power companies in San Francisco unless and until such white tag has been placed.

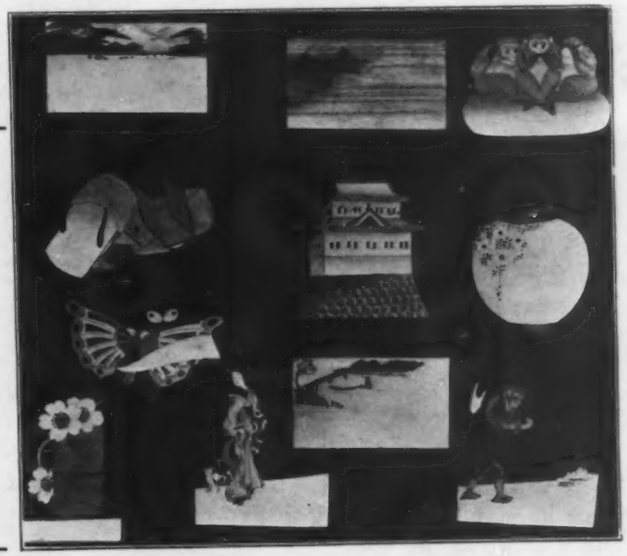
On installations where portions of a building are completed in advance of other portions, permits and white tags to connect the completed portions will be issued by the department and attached by the inspectors so that service may be given the completed portions.

On urgent installations, permission to set meters in advance of the official approval of the installation may be obtained from the chief inspector upon request.

On temporary installations using power for construction purposes, permission to connect shall be afforded during the construction period only and connections made for construction purposes shall not be used for supplying the building.

The use of current for connecting up and testing motors and other equipment is not prohibited, provided the installation is not left in a condition for use.

On all "old" installations, where power companies are required to enlarge the service or meters, notice of such enlargement shall be immediately given the Department of Electricity.



INGENUITY WINS

Here is why the Japanese today lead the world in the little things—details of life that awaken admiration in the observer. These miniature tags and placards have carried Japanese ideas and Japanese ware into every country of the civilized world. This care of details and beauty in the small things of business is a standard which the public recognizes and acknowledges with patronage. The lesson is one which might well be studied by the dealer in electrical ware here in America. There are, for instance, window displays and shelf arrangements and business cards and packages which often might be made attractive by just this careful attention to the beauty of the little things.

IF I WERE AN ELECTRICAL DEALER

BY L. H. NEWBERT

(The series of "If I Were a ———" papers which is being read at the meetings of the San Francisco Development League is proving a source of entertaining as well as helpful suggestion. The author of the analysis given here is manager of the commercial department with the Pacific Gas & Electric Company.—The Editor.)

If I were an electrical dealer I would adopt as my business creed the Golden Rule; in other words, I would serve my customers as I would wish to be served were I a customer.

I would do by the central station as I would have it do by me.

I would deal with the electrical jobber and manufacturer as I would have either deal with me.

I would co-oporate with my competitors.

I would locate my store in or adjacent to the shopping district, for the reason that women purchase the great majority of current-consuming devices.

I would endeavor to keep my place of business as attractive as a well conducted jewelry store, and would give particular attention to window display.

I would provide comfortable seating accommodation for waiting customers, having women particularly in mind.

I would make sure that my salespeople had a thorough knowledge of all devices carried in stock, and see that they waited on customers in such manner as to insure their return to my store when again in need of something electrical.

I would take a kindly interest in the welfare of my sales force, and would establish some bonus or profit-sharing plan that would enable them to earn something in addition to their salaries.

I would maintain membership in the California Contractors and Dealers' Association, and would take a practical interest in its activities.

I would support the California Electrical Co-operative Campaign.

I would join the Pacific Coast Section of the National Electric Light Association, and would do my best to attend its meetings.

I would also become a member of the Society for Electrical Development, and would carefully study the literature issued by it. It contains splendid thoughts for persons interested in increasing sales of electrical energy.

I would subscribe for several publications devoted to merchandising, and would encourage my sales people to read them regularly.

I would make liberal use of advertising material obtainable from manufacturers of devices, and would have such literature headed "Purchase your electrical appliances from an electrical dealer." This advice would also appear on my stationery, bills, wrapping papers, etc.

I would keep a card stock record in order that I might readily present, at the close of each month, a statement of my financial condition.

I would accurately determine my overhead expense.

I would endeavor to discount my bills.

I would seek the acquaintance of business men in other lines and discuss with them their business methods with a view to improving my work.

Insofar as my time would permit I would engage in improvement club or other organization work having for its objective the development of the community in which I was located, thereby improving my business opportunities.

Last, but by no means least, I would leave nothing undone to secure the good will of the central station employees, from the local manager down to the office boy.

Success in business comes to those who have the ability to do, and unless a dealer in electrical merchandise can reasonably do the things herein enumerated, he will find it necessary, sooner or later, to seek another field of endeavor.

CURBING SIGNS

BY A. L. SPRING

(Lamp sales are looked upon by many merchants as a part of routine business which requires no special advertising or thought. What can be done by a little attention devoted to this end of the stock is suggested by the following. The idea presented here by the Southern California representative of the California Co-operative Campaign is capable of adaptation for business getting along any line of your electrical supplies or appliances.—The Editor.)

We are accustomed to seeing curbing signs advertising different brands of gasoline and used by Uncle Sam in his drive for enlistments and Liberty Loan subscriptions, but seldom have we seen one used by an electrical dealer. If this form of advertising is good enough for Our Country, it should be good enough for our business. If it is valuable to other merchants it should be valuable to the electrical dealer.

Recruiting customers

The accompanying photograph shows the curbing sign in use by W. J. Burke, electrical dealer, 2591 West Pico street, Los Angeles. This merchant's location is on one of the principal thoroughfares between Los Angeles and the beaches, and numerous automobiles and street cars continually pass his store. The total cost of this sign was only $5.00, and yet it is very effective; the letters are all in white and the background in blue, the same colors used on the cartons and in advertising the brand of lamps that he handles.

This sign has more than doubled Mr. Burke's lamp sales, as well as appreciably increased the balance of his business. The following gives an idea of the drawing power of this form of advertising. The picture was taken on Saturday, and on that day alone two lamp sales aggregating $26.10 were made which were directly traceably to the sign; in other words, it paid for itself that day. More curbing signs would mean more business for the electrical dealer.

Technical Hints

DEPARTMENT CONDUCTED BY GEORGE A. SCHNEIDER

50 DEGREE MOTOR RATINGS

(This article dealing with the new method of rating motors is one of particular timely interest, since motors rated on this basis are now beginning to make their appearance on the market. The need for caution in watching the temperature rise, particularly where motors are exposed to the sun in hot climates, is here emphasized and practical suggestions presented. The material is of especial value to the dealer, contractor, or others who are interested in the everyday application of motors for industrial purposes.—The Editor.)

Electric motors are rated at the normal output, expressed in horsepower, which they will develop under certain specified conditions. The load which a motor can carry is limited either by the permissible temperature rise caused by the current or by sparking at the commutator. The rating of a motor depends largely on the continuity of operation and degree of enclosure of the windings. It is apparent that a motor can be rated higher for intermittent service than for continuous service; conversely, a motor designed for intermittent service must not be used at the same output or load for continuous service. All motors, whether rated for continuous or intermittent duty, can carry loads in excess of their rating. The amount of this overload will depend entirely upon the design and service conditions under which the motor is used. As will be noted later, certain types of motors now coming into the market are not given an overload rating. This is quite in contrast with the earlier methods of rating which provided for a certain amount of overload.

Since the rating of a motor is limited by the heating, it is obvious that the various parts and windings should be as well ventilated as possible; also that their rating is dependent upon the temperature of the surrounding atmosphere. In some cases it is necessary to enclose the windings to protect them from mechanical injury, excessive moisture, dust, or for similar reasons. Motors for industrial purposes are for this reason classified according to the degree of enclosure or protection provided. There are 12 recognized types of which the most common in use are open, semi-enclosed and enclosed.

In accordance with the standard accepted definitions, the "open" machine is of either the pedestal-bearing or end-bracket type where there is no restriction to ventilation, other than that necessitated by good mechanical construction. A "semi-enclosed" machine is one in which the ventilating openings in the frame are protected by wire screen, expanded metal or other suitable perforated covers, having apertures not exceeding ¼ of a square inch in area. An "enclosed" machine is one so completely enclosed by integral or auxiliary covers as to prevent a circulation of air between the inside and outside of its case, but not sufficiently tight to be termed airtight.

It is apparent that the more completely the windings are enclosed, the poorer the ventilation and therefore the lower the rating for a given frame size and temperature rise. Semi-enclosed motors can usually be operated at the output of the corresponding motor when not enclosed but at a higher temperature rise. An enclosed motor must be built in a much larger frame than the corresponding open motor. However, it is customary to operate enclosed motors at a higher temperature than is allowed for open motors. The open motor has the best possible ventilation, and therefore for a given rating is the cheapest motor to use, and should always be selected when conditions will permit.

In any case, whether the motor is open or enclosed, it should not be operated under conditions that will allow the temperature to reach a point that will cause the insulation employed in its construction to deteriorate. However, the most careful investigation, supported by the results of wide experience, has shown that there is no advantage in operating electrical machinery at temperatures materially lower than the safe limits permissible for the insulating materials employed in its construction. The American Institute of Electrical Engineers (A. I. E. E.) in its issue of Standardization Rules, has made definite recommendations regarding the permissible temperature and temperature rises to which various insulating materials may safely be subjected. The resultant temperature rise recommended for the ordinary general purpose open type motor is 50 deg. C. See A. I. E. E. Standardization Rules, Section 302, 341, to 348 inclusive, and Table III, page 38, Class A of the edition of October, 1916.

As will be noted in the foregoing paragraph, all temperature measurements in the A. I. E. E. rules are expressed in degrees Centigrade. Accordingly, temperature measurements throughout this article will be expressed in the same manner. However, the following table of comparison between the Centigrade and Fahrenheit scales for the values to be used in this article is given for those who are more familiar with the Fahrenheit thermometer.

Table of Comparison Between Centigrade and Fahrenheit Scales

Centigrade	Fahrenheit
15	59
25	77
40	104
50	122
90	194
105	221

The Electric Power Club, an association of motor manufacturers, has endorsed the action of the A. I. E. E. by adopting as a standard a continuous time rating for open type motors designated as the "50 degree" rating.

Heretofore, standard general purpose motors have been designed and sold on the basis of a double rating; that is, to operate continuously at full load with a temperature rise not to exceed 40 deg. C. and following this for 2 hours at 25 per cent overload with a temperature rise not exceeding 55 deg. C. These temperatures were based on the thermometer method of measurement with the ambient temperature of reference, that is, the temperature of the air surrounding the machine taken as 25 deg. C.

Continuous rated 50 degree motors are based on a single rating, which for a given frame size and for

continuous operation is the highest, consistent with long life of insulation. These motors will carry full load continuously with a temperature rise not exceeding 50 deg. C. In this case, also, the temperatures are to be taken by the thermometer method but are based on a temperature of reference of 40 deg. C. instead of 35 deg. C., which was the standard temperature of reference for the old method of rating. It should be understood that continuous rated 50 degree motors are not given an overload rating, but will carry a momentary overload of 50 per cent without injurious heating or sparking. Accordingly, these motors should be used for conditions in which the load requirements are accurately known, and under which the motor will not be subjected to load in excess of its rating.

Those of our readers who are interested in the method of arriving at this maximum allowable temperature rise of 50 degrees for continued rated motors, are referred to Table III of the Standardization Rules heretofore mentioned. This table gives the highest temperature to which Class A insulating materials, such as are commonly employed in the construction of industrial motors, should be subjected as being 105 deg. C. under any condition. Class A insulating materials include cotton, silk, paper and similar materials, when so treated or impregnated as to increase the thermal limit, or when permanently immersed in oil; also enameled wire. In accordance with the Standardization Rules the ambient temperature of reference, when the cooling medium is air, shall be 40 deg. C., as previously stated. By deducting this temperature of reference from the maximum permissible temperature for Class A insulating materials, the permissible temperature rise is obtained.

As it is usually impossible to determine the maximum temperature, that is, the temperature of the hottest spot attained in insulated windings, a correction factor must be applied to the observable measured temperature to approximate the difference between the actual maximum temperature and the measured temperature by the method used. This correction or margin of security is provided to cover the errors due to the fallibility in the location of measuring devices, as well as inherent inaccuracies in measuring and methods.

There are three different methods of determining the temperature of the various parts of a machine. One is the thermometer method. This method consists of applying mercury or alcohol thermometers, preferably having a Centigrade scale, to the hottest accessible part of the completed machine. With this method the hottest spot temperature is estimated by adding a correction of 15 deg. C. to the highest observable temperature as shown by the thermometer. As already shown, the maximum temperature to which Class A insulating materials should be subjected is 105 deg. C. Applying a correction factor of 15 deg. C., gives 90 deg. C. as the maximum observable temperature measured by thermometer. In other words, when the observable temperature measured by thermometer is 90 deg. C., the hottest spot temperature in the windings is assumed to be 105 deg. C. Deducting the temperature of reference, 40 deg. C., from this maximum observable temperature, 90 degrees, gives a temperature rise of 50 degrees. That is, the maximum observable temperature rise taken by the thermometer method must not exceed 50 deg. C.

In comparing the applicability of two motors of the same horsepower rating, the one on the single continuous rated basis of 50 degrees rise and the other on the old 40 degree or double rated basis, it will often be found that if the load requirements are carefully ascertained, the motor without overload capacity will operate successfully because the particular service under consideration may not require the margin of safety available in the double rated motor.

In making motor applications it must be remembered that the maximum observable temperature taken by the thermometer must not exceed 90 deg. C., which corresponds to an assumed hottest spot temperature in the windings of 105 deg. C., under any conditions. So if the room temperature should exceed 40 deg. C., a temperature rise of 50 deg. C. could not be allowed, as otherwise the motor would attain a temperature higher than that to which the insulation could be safely subjected. In cases where the room temperature is likely to be higher than 40 deg. a larger motor will be required. This point will need to be watched carefully where motors are exposed directly to the rays of the sun such as they frequently are in connection with irrigating plants in the West.

Further, care must be used in applying these motors to centrifugal pumps or blowers. In these machines, the load increases approximately in proportion to the cube of the speed. Thus, a 5 per cent increase in speed would overload the motor about 15 per cent. Errors of this kind can easily result from slight variations in pulley diameters. Again, when using centrifugal pumps there is always danger of the driving motor being overloaded in case the head against which the pump is working is reduced.

In the future more care will also be required in selecting fuses or relays for these 50 degree motors, since they are not intended to be operated under overloads except of a momentary nature. For these motors, running fuses or relays rated at 110 per cent of the motor amperes will probably be adopted as standard.

A number of manufacturers already have lines of motors rated on this basis in production and will soon have them available for delivery. In fact, one company has been delivering many sizes of direct current motors for some time and has just recently announced that a number of ratings of polyphase motors are also ready. Some manufacturers are simply re-rating their older motors to comply with the new standards, while others are actually bringing out new lines.

The information given here applies only to standard open type motors such as are commonly used for industrial service. Other lines of electrical machines are now, however, continuously rated, but different methods of determining the temperature may be used and the correction factor given here does not necessarily apply to all types of electrical machinery, kinds of insulation or methods of measurement. Full information on these points is given in the Standardization Rules heretofore mentioned.

DEL MONTE WAR SERVICE CONVENTIONS

("The greatest meeting that has ever been held among the electrical men of the West," is the general verdict on the recent joint convention at Del Monte. In serious attainment, the convention fully justified itself as a war measure in inspiration and practical accomplishment. And the many delightful opportunities for social intercourse helped to provide that foundation for cordial good fellowship which is the basis of later co-operative ideals.—The Editor.)

DEL MONTE WAR SERVICE CONVENTIONS

In the quaint streets of Monterey

WITHOUT question, a new era in electrical affairs has been initiated in the West. The great Del Monte conventions of the California Association of Electrical Contractors and Dealers, the Pacific Division of the Electrical Supply Jobbers Association, and the Pacific Coast Section N. E. L. A., are at a close, and the unanimous verdict from all sides is that a true war service has been rendered to the industry and the nation and results attained that once again emphasize the splendid spirit of helpfulness that is now so prevalent in the West.

From the time that the carefree jobbers began to make their appearance at the beautiful Hotel Del Monte on Monday morning, on down through the week until the last farewells were said on the following Sunday, an enthusiasm prevailed at the sessions of these conventions that clearly marks the advent of a new era in the electrical industry in the West. This new spirit was further emphasized at the various meetings of the conventions. And the final climax was the strong support that was given to the appeal made by W. L. Goodwin for nationalization of contractor-dealer effort agreeable to the "Goodwin Plan."

Then came the arrival of the Southern California delegation on Thursday morning, where to the weird shrieks of the Aztec yell, Captain Jackson and his cohorts welcomed W. A. Brackenridge, R. H. Ballard, H. H. Jones and the host of others from Southern California, who had in the previous year established such a wonderful record in convention ideals at Riverside.

The splendid war service ideals that were brought out at Thursday's session of the engineering section were fully equaled again in the evening when the women of the convention under the leadership of Mrs. H. F. Jackson, held a well-attended war service session to which all in attendance at the convention — men and women — were invited.

Miss Gertrude Tucker, secretary to the president of the Southern California Edison Company, read a paper on "What women can do to help maintain the public utility efficiency." She dealt largely with the splendid new ideals that have recently been instituted in her company and deeply impressed her audience with the effectiveness of this new work among women, now of such increasing importance in the industry. Mrs. F. A. Gibson of the women's war board of the National Council of Defense spoke on "Americanization," and showed how necessary it is for effective work among the foreign element in our present national emergency.

One of the refreshing and delightful entertainment features of the convention was the beautiful exhibit of autochrom pictures by L. P. Lowe on both Wednesday and Thursday evenings. The views were largely taken during the Panama-Pacific International Exposition and showed in colors taken from nature the wonderful scenic effects of the great exposition.

And then after a record breaking day of accomplishment in the commercial section sessions on Friday came the long-to-be-remembered banquet that evening.

Professor Charles Mills Gayley, the newly appointed Dean of the Faculties of the University of California, and of international reputation as a writer, held the vast audience in spellbound attention for 55 minutes while he spoke on "War Service Ideals." In conducting the meeting R. H. Ballard, as toastmaster, who has long been recognized as a leader in utility thought, was never more effective and self-poised than on this occasion. The spot lights and scenic illuminative effects that assisted in the dances of the nations that were presented added their part in inducing the patriotic fervor of the occasion. The audience, too, responded in a marked degree throughout, especially in the singing of the songs from a booklet which had been presented to the convention through the courtesy of one of the manufacturing companies.

THE FAMOUS RIDES IN AND ABOUT DEL MONTE

Here are shown the famous Golf Links, the Seventeen-mile Drive and other points of interest in their relation to San Francisco and the coast cities.

THE CONVENTION ASSEMBLED

The out-of-door sports events held forth on Saturday morning while the afternoon's trip to The Highlands at Carmel-by-the-Sea proved unique and enjoyable to all.

It is hard to place particular credit upon any individual or group of individuals for the splendid work performed by those who had the affair in charge. From the president who opened the convention sessions down through all the committees, a team work, seldom witnessed in affairs of this nature, made it possible to achieve these splendid results now a bright page in the history of the electrical industry in the West.

The convention committee, and the various duties assigned, was composed as follows:

Robert Sibley, chairman. Reception—R. F. Behan. Out-of-door Sports—W. S. Berry. Banquet—T. E. Bibbins. Ladies' Affairs—Arthur Rowe and J. B. Black. Finance—M. A. DeLew. Transportation—W. M. Deming. Entertainment—R. E. Fisher. Registration—H. P. Pitts. Program—J. W. Redpath. Automobile—H. C. Reid. Southern California—A. B. West, E. R. Northmore, H. H. Jones and W. L. Frost.

THE LADIES' EVENTS

In addition to the War Service Session of the women of the conventions on Thursday evening, many little informal social gatherings and auto parties were planned and carried through for the women. On Thursday afternoon the women themselves held a most enjoyable affair in the west sun parlor of the hotel. Those who so ably assisted in this affair were: Mrs. J. A. Vandegrift, Mrs. W. G. Vincent, Mrs. Nelle H. McMaster, Mrs. W. M. Deming, Mrs. R. E. Fisher, Mrs. H. P. Pitts, Mrs. J. E. Woodbridge, Mrs. F. S. Schuyler, Mrs. Robert Sibley, Miss Gertrude Tucker and Miss Clotilde Grunsky.

THE FIELD EVENTS ON SATURDAY

Saturday proved to be a gala day in the bracing air of Del Monte for men and women of the convention who had been devoting such long hours to serious war service discussions in previous days.

W. S. Berry, the able executive in charge of out-of-door sports, and his committee, proved themselves fully equal to the occasion.

CO-OPERATION CHORUS

By A. H. Halloran

(Tune: Funiculi, Funicula)

The dealer has a deuce of a time to sell, sir,
Co-operate! Co-operate!
The other fellow cuts the price to hell, sir,
Co-operate! Co-operate!
The central station sells the lamps and sockets,
Co-operate! Co-operate!
And nothing's left for me but empty pockets.
Co-operate! Co-operate!

Here comes a jolly golfing jobber roaring
Co-operate! Co-operate!
His cost of doing business is soaring.
Co-operate! Co-operate!
His overhead's too high and growing higher.
Co-operate! Co-operate!
He tries to make his profits out of wire.
Co-operate! Co-operate!

PRIZES AND WINNERS OF EVENTS IN OUT-DOOR SPORTS

Golf—

Best net score, Del Monte Cup and $5.00 War Savings Stamp—E. A. Rogers.

Second best; electric alarm clock and $5.00 War Savings Stamp—F. E. Blake.

Third best; $5.00 War Stamp—P. M. Lincoln.

Net score, nearest average; electric lantern—Tie score by M. H. Schnap, R. T. Stafford, Chandler Bloom, W. L. Sawyer, with prize awarded to M. H. Schnap.

Special prize, secret conditions, highest net score; fire extinguisher—Carl Heise.

Jobbers' Old Copper Cup, P & S and Del Monte Cups, to C. C. Hillis.

Jobbers' Manufacturers' Cup—Frank Fagan.

Turner Trophy—Frank Airey.

Ladies' Putting Contest—

Best score; electric percolator and $5.00 War Stamp—Mrs. Neile H. McMaster.

Second best; $5.00 War Stamp—Mrs. W. M. Deming.

Third best; electric iron—Mrs. S. J. Lisberger.

DEL MONTE, MAY 6-11, 1918

Chorus.
I am a friendless poor utility, sir.
Co-operate! Co-operate!
I make both gas and electricity, sir.
Co-operate! Co-operate!
I'm ever working for the public good, sir.
Co-operate! Co-operate!
But all my actions are misunderstood, sir.
Co-operate! Co-operate!

Chorus.
And I'm a peddling manufacturer bold.
Co-operate! Co-operate!
I'm back of every little fact you are told.
Co-operate! Co-operate!
I sing my siren song both night and morning.
Co-operate! Co-operate!
Remember now you all have had fair warning.
Co-operate! Co-operate!

Chorus.
Dealers, jobbers, power companies,
Wholesale, retail, manufactories.
Co-operate, co-operate, co-operate, co-operate.
Get together, boys! Co-operate.

Tennis—

Ladies' first prize; electric toaster and $5.00 War Stamp—Mrs. S. J. Lisberger.

Second; $5.00 War Stamp—Mrs. W. G. Vincent.

Men's first prize; electric spot light and $5.00 War Stamp—W. G. Vincent.

Second; $5.00 War Stamp—John R. Brownell.

Swimming Contest—

Men's first prize; large electric fan and $5.00 War Stamp—N. A. Bowers.

Second; $5.00 War Stamp—Frank Boyd.

Ladies' first prize; electric stove and $5.00 War Stamp—Miss Eunice McKinley.

Second; $5.00 War Stamp—Mrs. Kellogg.

Third; electric iron—Mrs. R. S. Masson.

Children's Maze Race—

First prize; $5.00 War Stamp—John Carlson, Jr.

Second prize; small electric fan — John Francis, Jr.

REWARD!

A $50 LIBERTY BOND IS OFFERED FOR THE IDENTIFICATION OF

The Mysterious Electric Raffles

MYSTERY IS IN OUR MIDST. SOMEWHERE AMONG US LURKS A MAN WHO IS WANTED—OR IS IT A WOMAN? HE—OR SHE—MAY STAND BESIDE YOU NOW. WHO IS YOUR NEIGHBOR?

In order to facilitate the discovery of the mysterious stranger, the Convention Committee has offered a $50 Liberty Bond to the person first addressing Raffles properly, giving his (or her) first and last name and his* full company name, the introducer to also give his first and last name and company name. The proper salutation is as follows:

"Pardon me. You are John Jones of the Up-to-Date Electric Company, the 'Mysterious Electric Raffles.' I am John Smith of the Know-How Electric Company. We will win the war and do it electrically."

The first person to thus address Raffles letter perfect will be announced as the winner at the banquet of Friday evening. Only registered members attending the convention will be eligible to the prize.

Announcement of Raffles' first public appearance is made elsewhere in this issue.

*For convenience sake, we have permitted the masculine pronoun to embrace the feminine.

A PAGE FROM THE FIRST JOURNAL SERVICE ISSUE

The mysterious Raffles, whose identification provided so much amusement, was not discovered until the evening of the banquet, when C. E. Ingalls put the proper question to Mrs. Lowell Redfield. The page is from one of the two miniature issues of the Journal of Electricity distributed at convention.

GENERAL SESSION PACIFIC COAST SECTION, N. E. L. A.

(From the first word of the president's report to the close of convention, a spirit of war dedication and co-operation pervaded the gathering. The record of business sessions and the reports of officers of the Pacific Coast Section, N. E. L. A., are here given. Of particular interest are the recommendations of the outgoing president and the election of officers. The progressive policies and executive ability of the new leaders promise a fruitful year for 1918-19.—The Editor.)

BUSINESS SESSIONS

The routine business of the Association was conducted at the opening and closing sessions. President H. F. Jackson made important recommendations for future work, as did likewise the report of the public policy committee, published elsewhere in these columns.

The report of the Public Policy Committee was read by Mr. John A. Britton, who supplemented the written recommendations of the report by an earnest plea that a strong committee be formed to see that the fundamental facts regarding the electric business are printed in the daily press. He recommended that the president be instructed to arrange for an association bureau of publicity and advertising. This recommendation, as well as those contained in the written report, was unanimously adopted.

Mr. Britton also made most favorable reference to the Women's War Service Session, especially commending Miss Gertrude Tucker. Much of the public utility work of the future will be carried on by women and every effort should now be put forth to provide for their proper training.

Resolutions were adopted referring to the necessity for water power development, for greater publicity relative to utility activities, and as favoring a sane program of education and Americanization of our foreign-born population. The help of the several governmental departments interested was requested in studying power problems.

The engineering committee introduced resolutions calling for further study of interconnection, the use of instruments for conserving heat and increasing efficiencies, and for a study of available fuel resources and the adjustment of power business thereto.

A resolution introduced by the commercial committee extended the California Electrical Co-operative Campaign six months beyond December 31, 1918. The recommendations relative to indexing, codifying and cataloging sales data were referred to the new commercial committee.

A roll of honor will be established to contain the names of those enlisted in the defense of the nation, and their membership continued without payment of dues.

The thanks of the Association was extended to the contractors and jobbers association for holding sessions at the same time, and an invitation extended to meet together again. Thanks were also given to the several other associations and commissions represented, including the Northwest Electric Light and Power Association, the Railroad Commission of California, the California Industrial Accident Commission, D. M. Folsom and F. H. Fowler.

Other resolutions were passed thanking the Hotel Del Monte, the officers and the convention committee for their work.

The newly elected officers for the ensuing year are:

President—Samuel Kahn, Western States Gas & Electric Company.

Vice-President—E. R. Davis, Southern California Edison Company.

Vice-President—A. E. Wishon, San Joaquin Light & Power Corporation.

Secretary—A. H. Halloran, Journal of Electricity.

Treasurer—J. F. Pollard, Sierra & San Francisco Power Company.

The executive committee consists of the five officers of the Association, together with the following members:

H. S. Aller, Pacific Gas & Electric Company, Phoenix, Arizona.

Wm. Baurhyte, Los Angeles Gas & Electric Company, Los Angeles.

J. B. Black, Great Western Power Company, San Francisco.

Henry Bostwick, Pacific Gas & Electric Company, San Francisco.

Geo. A. Campbell, Truckee River General Electric Company, Reno, Nevada.

C. M. Einhart, Roswell Gas & Electric Company, Roswell N. M.

D. E. Harris, Pacific States Electric Company, San Francisco.

H. F. Jackson, Sierra & San Francisco Power Company, San Francisco.

H. H. Jones, San Diego Consolidated Gas & Electric Company, San Diego.

Frank Somers, Garden City Electric Company, San Jose.

K. E. Van Kuran, Westinghouse Electric & Mfg. Company, Los Angeles.

A. B. West, Southern Sierras Power Company, Riverside.

RECOMMENDATIONS BY THE PRESIDENT

President H. F. Jackson, in the course of his presidential address, made the following definite recommendations:

1. That the work of the executive committee and officers of the Section during the past year toward a more cordial understanding and a closer physical interconnection between central station companies be carried forward as much as possible, with a view to conserving resources and improving service.

2. That the movement to cement the relationship between central stations, jobbers, manufacturers and contractor-dealers be encouraged, and to this end that the Section officers endeavor to form a committee consisting of one member from each of these interests to devise plans for perfecting a closer co-operation.

3. That an especial effort be made to increase Class B membership.

4. That the Section recommend and urge the National Association at the coming annual meeting to change its Constitution and By-laws so that one-half of payments made by Class A members be returned to the Section for its local needs.

These were referred to a committee consisting of H. H. Jones, C. M. Einhart and T. E. Bibbins.

The committee earnestly commended the annual address of the president of the Geographic Section of the National Electric Light Association for its record of accomplishments and for its clear and forceful expression, and particularly endorsed for favorable action to the committee on resolutions, the adoption of his recommendations.

First—That the endeavor of the executive committee towards a more cordial understanding and closer physical interconnection between central stations and power companies be carried forward.

Second—That the cementing of the relations between central stations, jobbers, manufacturers and contractor-dealers be encouraged by appointment of a committee for that purpose.

Third—That especial effort to increase the interest on the part of Class B membership in the Association.

Fourth — That this Section recommend to the proper authority changes in its Constitution and By-laws regarding the payments made by Class A members.

REPORT OF SECRETARY

Secretary A. H. Halloran reported as follows:

To the Executive Committee and Members, Pacific Coast Section of the National Electric Light Association:

If the enthusiasm and heavy registration at the opening of the convention is any measure of the section's present activity, but few words of past record are needed from the secretary.

The various undertakings of the section are covered in the president's address and the several committee reports. All the papers and reports have been printed in the Journal of Electricity so far in advance of the date of meeting that ample time has been available for study and preparation of discussion. As much of the discussion will be submitted in written form, it has been decided to dispense with the usual stenographic report and publish merely a summary of the essential features brought out by the various speakers.

Under date of April 7th, the Association had enrolled 700 members, classified as follows:

	Arizona	Calif.	Nevada	New Mexico	Total
Class A	10	16	6	9	41
Class B	37	479	13	..	529
Class C	..	4	..	1	5
Class D	..	54	..	..	54
Class E	..	71	..	..	71
	47	624	19	10	700

This shows a numerical membership of about half that of last year, due largely to abnormal conditions brought on by the war. Three Class A memberships have been lost because of absorption by existing member companies. Many Class B and E members are now in the government service. The Class D membership shows nearly 50 per cent increase.

The earnest efforts of the membership committee under the chairmanship of W. L. McKinley have been productive of many renewals and new applications. Especially noteworthy has been the work of H. N. Sessions of the Southern California Edison Company.

The decrease in membership, as will be shown in the Treasurer's report, also means a corresponding decrease in income. As already stated by President Jackson, the National Association allots to a Geographic Section not to exceed half the stated dues paid by its members. Thus it is estimated that at least $5000 will be paid in stated dues by section members this year, of which amount $2500 will be returned to the section. In addition, ten Class A members operating in cities of 25,000 or more and paying one-fiftieth of 1 per cent of their gross earnings to the National Association, contribute $6000 more, none of which is returned to the Geographic Section. The executive committee has already taken steps to have the National Association rebate half this latter amount toward the conduct of section activities.

The secretary at this time desires to express his appreciation of the co-operation of the members and committees in carrying on the section work during the past year. Special mention should be made of the excellent work of the convention committee, of which Robert Sibley is chairman, and of the hotel and transportation committee, under the direction of W. M. Deming. The activities of the other members speak for themselves in results evident here.

There is every indication that this great meeting will effectively fulfill the true function of a convention—that of instilling in the minds of its members a higher conception of their duty, one to the other, and thus bring about the harmonious and co-ordinated action of every branch of the electrical industry represented in the Pacific Coast Section—"one for all and all for one."

REPORT OF TREASURER

Treasurer A. N. Kemp reported as follows:

For the year ending December 31, 1917, it will be noted that the total receipts amounted to	$7,255.50
And disbursements were in the amount of	5,248.11
Leaving a balance to be carried forward to the new year of	$2,007.39
Since that date, down to and including May 4, 1918, there has been received a refund on account of engineering advances in the amount of	242.70
	$2,250.09
There has been expended, as per the attached memorandum	875.19
Leaving a net balance on hand of	$1,374.90
To this there is to be added our proportion of membership dues from the parent association of	2,437.50
Making a total cash of	$3,812.40

The budget for the current year agreed upon at a meeting of our executive committee held on March 21st, called for $3,275, subdivided as follows:

Salaries	$1,250.00	
Traveling Expenses	250.00	
Stationery and printing	500.00	
Office expenses	300.00	
Postage	200.00	
Convention expenses	250.00	
Contingent	250.00	
Publicity convention reports	275.00	
		$3,275.00
Of this amount there has been expended to May 5th		875.19
Leaving (according to the attached) still to be expended the sum of		$2,399.81

It will be noted that cash on hand and due from parent association is more than sufficient to meet these requirements.

Your attention is called to the fact that the Association is still indebted in the amount of $1500 to companies noted below, to cover advances made when the Association was formed:

Great Western Power Company	$ 168.00
Los Angeles Gas & Electric Corporation	85.00
Pacific Gas & Electric Company	530.00
Pacific Light & Power Corporation	175.00
San Diego Consolidated Gas & Electric Company	56.00
San Joaquin Light & Power Corporation	98.00
Sierra & San Francisco Power Company	72.00
Southern California Edison Company	260.00
Western States Gas & Electric Company	56.00
	$1,500.00

Bank statement in verification of the above was attached.

PUBLIC POLICY

BY JOHN A. BRITTON

(Perhaps the most important event of the convention was the report of the Public Policy Committee, as given by John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, chairman of the committee. The many problems now confronting the electrical industry are here discussed with broad minded sanity and a most valuable and comprehensive program outlined for the coming year. Labor shortage, fuel shortage, the necessity for hydro-electric development and its means of attainment, rate increases and policies toward the education of the public which must necessarily accompany these, are considered in a way which met the hearty approval of the convention.—The Editor.)

Since the submission of its initial report by the Public Policy Committee, so many occurrences in the field of endeavor of public utilities have arisen of a serious nature that a report of ordinary character becomes at once an impossibility. The past year has been one fraught with complexities, not only in operation but in administration, but outstanding as the one result obtained during the year through the helpfulness of the Association and its members is a general change for the better in the relation of companies one to the other where geographical and physical conditions have made such closer inter-relations a possibility, and while it was but a suggestion, as contained in the report, the fact that it has been accomplished emphasizes the good that can be accomplished by organizations of this character. The full results that may be accomplished have not as yet been realized, but it is anticipated that because of the relations that now exist, the full extent of the recommendations made will during the coming year have full fruition.

True to the traditions of old, the public utilities have by their co-operative efforts with the government and its recognized agencies, in all of the demands made upon them, given to the loyal people of the United States a different perspective in contemplating utilities as such, and it is strongly recommended by your committee that a bureau be established, to act in conjunction with national bodies organized for that purpose, looking to the distribution of a propaganda calling for a fair consideration of the rights of utilities, and that the old and time-worn spirit of antagonism be forever buried and forgotten, that the public may be brought to the realization that in these times of our troubles, common to all, that the public utilities stand for all that the people stand for, and that under regulation the people are protected from profiteering by the utilities to a greater extent than the people are protected by the government regulation of all of the commercial industries and businesses.

Whereas, the future welfare of the Public Land States depends upon water power development to increase the location therein of industries, to which cheap and constant power is a necessity, and to further develop their agricultural possibilities; and

Whereas, true conservation consists in saving that which is destructible, such as our forests and oil and coal deposits, and using that which is indestructible, our falling water; and

Whereas, the immediate development of a potential power by water of not less than 100,000 horsepower per year would bring arid lands into bearing, provoke the development of industries utilizing the hidden wealth of the Public Land States, and build up an empire in the West; and

Whereas, the existing laws have prohibited the full development of the water power of these states; now, therefore, be it

Resolved, That the Pacific Coast Section of the National Electric Light Association, in convention assembled, urges upon the Congress of the United States to enact at once such remedial legislation as will encourage development of the millions of horsepower now wasting to the seas, that true and not false conservation may prevail, and that the waste of fuels in generation of electric energy may be minimized;

Resolved, further, that a copy of this resolution be forwarded by the president of this Association to the President of the United States, to the Honorable Secretaries of War, Navy and Interior, and to the Honorable T. W. Sims, House of Representatives.

We again pledge ourselves to that offer made at our last convention to the President of the United States.

While it has been possible during the progress of the war for every type of industry to obtain under the protection of the laws of the United States a commensurate profit upon their undertaking, public utilities have, in but few instances been permitted to absorb the increasing costs of labor and material, and while the Wisconsin Commission in a recent decision stated that public information had to be considered, and therefore dilatory measures were employed in determining the rights of utilities, the commissions on the whole have arisen to the fact that unless protected by some prompt and efficient action, the utilities would be forced into a position that, as expressed by the Comptroller of the Treasury, would be a calamity to the nation.

Our Association's problems, in order of their importance, are:

First—Necessary increase in capacity of plants.

Second — Necessity for rate increases.

Third—Financial aid.

Fourth — Increase in demand for power.

Fifth—Decrease of man power.

Sixth — Co-operation in selling campaign.

Increase in Capacity of Plant

Added to the problem of meeting the war contingencies in the sudden growth on the Pacific Coast of industries not heretofore made a part of our industrial progress, and coupled with the intensive demands from our wonderful soils of the fruits of the earth, and the further necessity of the conservation of oil for governmental purposes, came the unforeseen climatic conditions that prevailed in the fall of 1917 and the spring of 1918, largely reducing the output of hydro-electric plants and forcing the necessity of increased production of energy by steam. This contingency, unlooked for and coming at a time when the companies were least prepared to take care of the situation, proved to be a not unmixed evil, for through the joint efforts of

the Railroad Commission and the Fuel Administration, there has been brought about in the state of California an interconnection of companies that it is safe to say could not have been accomplished otherwise than as a patriotic measure. It has thus afforded and created an appreciation of the economic advantages of centralization and unification, and a great and most potent saving of waste of capital and loss of energy in useless unrestrained competition. The results of the bringing together of the companies are to be found in the records of the Railroad Commission, and display in a very forceful manner the sacrifices that were made of individuality to accomplish the greater good to the nation.

The shortage of water for power purposes also brought out and strongly emphasized the need of congressional legislation to make the occupancy of public lands possible without such burdens as have heretofore been imposed, such burdens stifling added increments of water power and permitting the ruin and waste of natural power, and using up that same power in oil which should be conserved for purposes for which electric power is not available.

The Congress of the United States has now under consideration a bill for the leasing of public lands for power development, which bill, if enacted into a law, will materially help to unlock the doors which for years have been locked and have kept away the maximum possible development. The members of this Section should by every means in their power impress upon their representatives in Congress the necessity for the passage of some such legislation as will invite the expenditure of capital to produce power needed not only to meet the present and future demands on the Pacific slope, but to meet them under conditions that will prove the best from an economical standpoint for both the producer and the consumer.

Pending this much to be desired condition, the companies are doing their best by the distribution of available power jointly on each system, so as to produce the maximum efficiency of each plant as far as possible, and thereby the conservation of oil.

It has been estimated that in the territory of this state alone are 6,000,000 potential horsepower to be developed by the falling waters, of which not more than 1,000,000 horsepower have so far been developed, and with the growth existing of 50,000 horsepower per year and with but a fraction of the percentage of essential and necessary power generated by water power or steam power through central stations, a field is open which will do more to increase the population of this state and to bring its resources to the market than any other act that could be committed at the present time by the government of the United States. Surely this is a subject that is worthy of the most serious consideration of this Association, and your committee appends herewith a resolution which it recommends for adoption, and also recommends that copies thereof be forwarded to the President of the United States and the Secretaries of War, Agriculture and Interior, and also to the Honorable T. W. Sims, chairman of the Joint Committee of the House of Representatives, having under consideration the water power measure.

Necessity for Rate Increases

With the direct entrance into the war with Germany on April 6, 1917, by the United States of America, what had been to some degree an uncertainty prior to that time, became on that day a positive certainty—that all of the elements entering into the production and distribution of electric energy must rapidly increase in cost, and that the labor situation by reason of the demands of the government for the necessities of the war must likewise increase, and that therefore the prices previously obtained under general regulations, for energy, in the ante-war days, could not prevail and the operating companies exist.

Appeals to regulatory bodies were commenced during the year 1917 by companies which, as long as it was possible, forebore to apply for relief, anxious that their motives might not be misconstrued, and until it appeared that the capital invested in service to the public was facing absolute ruin if rates were not increased, appeals for relief were not made. In most cases the increases granted on preliminary applications were largely temporary, as the continued advances in price of labor and material could not be met by any action of rate-fixing authorities, so rapid were they in their character.

In his report to Congress the Comptroller of the Currency, John Skelton Williams—a name ever to be remembered in the history of public utilities—sounded the note of alarm and stated that—

"The breaking down of these corporations (meaning public utilities) would be a national calamity."

This view of the Comptroller was produced by the presentation to him of a report by a committee from the American Electric Railway Association, National Electric Light Association, American Gas Institute and National Commercial Gas Association, which report described in detail increases in cost, decreased net of operating companies, increases in investments to meet demand, and further the falling off in the market value of the securities of the utilities, and additionally emphasized the necessity for such action as would permit the refinancing of approximately $152,000,000 of liabilities of companies that would presently mature.

The Secretary of the Treasury, taking official notice of the report of the Comptroller, on February 15, 1918, by letter to the President of the United States, recited the conditions confronting the public utilities, and the President on February 19, 1918, replied to the communication of the Secretary, and in which reply among other things he said:

"It is essential that these utilities should be maintained at their maximum efficiency and that everything reasonably possible should be done with that end in view."

On the Pacific Coast the increased cost of oil has been the most potent factor in increasing the cost of service to public utilities; from October, 1916, to date, the base field price has risen from 35c. per barrel to $1.23 per barrel, and this has been all the more severe upon the electrical operating companies by reason of the greater demand made upon them for service and, as has been mentioned before, of the lessened hydro-electric output.

The average person never stops to think that if the service of the public utilities throughout the country should stop, the whole war program would instantly collapse. It follows that insofar as the efficiency of a public utility is impaired the war program is proportionately delayed and interfered with.

As illustrating the conditions of the companies: In some cases dividends have been suspended, others have been paid in scrip. In some cases even bond interest is already in danger and receiverships are threatened. Public utility credit is gravely affected and will soon be permanently impaired unless additional revenue can be very generally secured.

As a result of this depreciation in the credit of utilities and the extraordinary demands for money by the government, the market value of utility securities, as pointed out in the report of the Committee on Public Utility Conditions, has suffered a tremendous shrinkage. The securities of public utilities have long been a favorite form of investment for both small and large investors, savings banks, insurance companies and trustees, and are to be found as collateral for loans in every national and state bank. Their depreciation accordingly threatens our whole financial structure.

In this crisis it is most encouraging to note the helpful expressions from the president of the Railroad Commission of the State of California, made at a meeting held on March 6, 1918, before the University Extension Course, and from which we quote:

"In the situation which now confronts many of our public utilities, the duty of the State Commission is clear.

"While providing for the continuation of adequate service, it is their duty to act promptly and vigorously on applications for increased rates based on increased operating costs.

"Where the usual methods of rate making would result in unreasonable delays, short cuts must be applied to meet the emergency conditions.

"Our public utilities must be kept in a sound and healthy financial condition, so that they will be able to meet not merely the requirements of their existing patrons, but also the additional requirements of the war.

"The State Commissions should not wait until the utilities come to them with their pleas for assistance. It is their duty to inform themselves by their own investigations, if necessary, concerning the condition of the public utilities under their jurisdiction, and to keep themselves constantly informed.

"If the State Commissions rise to meet the situation, as they are doing in all sections of the country, they will be rendering a substantial service not merely to the utilities and their patrons, but also to the nation itself, which is largely dependent for war efficiency on the service of public utilities."

Financial Aid

With public utilities of our class there is a constant demand for capital expenditure, and expenditures that are aside from the large capital required in new plants, and that is the more or less insidious demand daily occurring to meet the ordinary applications for service, but which summed up in a year of operation amounts to vast sums of money.

The borrowing capacity of a utility depends in normal times upon its financial showing, and so the item of financial aid is intimately allied with earning power. Public marketing of public utility securities is today impossible, excepting by short term notes at prohibitive rates of interest. Congressional help, which is attempted to be given through the recently adopted Act of Congress, while affording some relief in refunding obligations, does not, because of the short term of loans by the government and the added fact that loans must be made only for enterprises directly connected with governmental war activities, afford relief for permanent extensions to plant, which cannot come into full earning power for years and which cannot be directly allocated to war activities. The utilities must themselves then take care of the future, and in no more certain way can this be accomplished than by being permitted to earn such return upon their capital as will encourage the investor. Once the investor is made certain in his own mind of the strength of the securities offered to him by assertions of helpfulness on the part of those authorized to give such assurances, so certainly will money be forthcoming to aid and assist in the upbuilding of the financial part of the utility. With the certain knowledge which we now have that for many years to come after the war is over demands for rehabilitation and reconstruction will provoke such continued demands for public utility service, we can assert a guarantee of assurance that protective rates will provide the certainty of security for such obligations as may now be issued in public utility work.

At best the ability of the utilities to enlarge their facilities will, during the progress of the war, be reduced to a minimum unless this aid shall be forthcoming, and it is certain that without some constructive help, from the state commissions, there will be a curtailment of demands not deemed to be purely essential in the furtherance of our nation's work.

Increase in Demand for Power

There are in the states embraced in the Pacific Coast Section of the National Electric Light Association but two sources of power worthy of consideration. First, that produced by falling water; and second, that produced by steam generation.

This report has touched upon the necessity for further and more intensive hydro-electric development as intimately affecting the development of this area. Agriculture will always, in its many and varied ways, be the dominant pursuit; irrigation and reclamation as connected therewith the equally important ones; and there is perhaps no greater thing necessary to the successful outcome of the war than the products of the soil. We must find ways and means to meet these demands and prepare ourselves for the day that is to come when with the embargoes now existing removed, there will be a forward movement towards the realization of the dream of a state bus bar—yes, even a national one, as the most economical method to serve the needs of the people.

Decrease of Man-Power

When the need for men arose in answer to the demand of the country that this world by aid of its man power should be made safe for democracy, and when from every city, town and hamlet there went forth men to serve under our banner, the call came in strongest terms to the men of the utilities, for they were men trained already to the hour in organization, in technique; the young, the active, the energetic man, whose first thought was of service to country. He was the man who needed little or no preparation to bear the brunt of the battle roar; his engineering skill, his initiative, his mode and manner of living, all fitted him to take up the great work and carry it forward to suc-

cessful conclusion. This withdrawal of man power has proven to be the most serious handicap to the fullest economical administration and development of utilities, not only in the loss of such trained men but in the necessity for the substitution therefor of men untrained and unfitted by contact and environment to take up the burden of those who have enlisted in the ranks.

This labor situation is one which we must face with the greatest concern, not only in its immediate present by the withdrawal of the effective man power, but in the future with the probability of never again approaching the degree of efficiency that heretofore has characterized organizations of the character of ours.

Your committee fully believes that if the general public, always fair in its final conclusion, can be made to feel the true force and effect of the participation of utilities in the service of the government, and their unquestioned patriotism, that when and as questions arise between the utility and the public, greater consideration will be shown than has heretofore been the case. It is difficult for a layman to realize what an investment of millions of dollars means to the service of the public; difficult to make them realize that a dollar invested in public utility work is just as much entitled to the protection of the public as is the dollar of a layman invested in any enterprise in which he has a direct and personal part, and that the same high ideals that prompt the citizens of this country to make sacrifices at this time for the benefit of the land they love, are those that prompt the public utility men—from manager to laborer—to be placed in the same class and be recognized as an integral part of our nation.

Aside from the giving of service by the depreciation of this man power, the utilities have been called upon constantly to render aid and assistance to the various branches of the Federal government, notably in connection with the Fuel Administrations of the several states; the enlisting of men in aiding the Department of Justice in its many ramifications; in all Red Cross work, and in the sale of Liberty Bonds. At no time has there been found lacking the necessary sacrifice of time and labor to make all of these governmental agencies effective, and the men of the public utilities have deemed it an honor to be classed as dollar a year men.

Perhaps one of the blessings in disguise occasioned by the war has been the necessity brought home to the public utilities for economizing in all of their departments by the elimination of unnecessary operation and by reducing so far as they can, through automatic devices and otherwise, the necessity for man power. Your committee has found upon investigation that every effort possible has been made by the public utilities to conserve men and material and to aid the Public Utility Commissions to reduce to a minimum the necessities for the rate increases.

One of our writers on economic subjects, in an article discussing the question of hydro-electric power in California, makes the following interesting statements:

"In California alone, the demand for energy of all kinds is increasing at least 10 per cent annually. If this annual rate of growth is reduced to 5 per cent and the production of fuel oil is increased to 105,000,000 barrels annually, it will require the development of 1,500,000 kw. of additional hydro-electric power during the next ten years to supply this increase in demand. With the necessary transmission and distribution facilities it will require an investment of $500,000,000 to effect such a development. Such an increase in hydro-electric installation will provide power for industrial plants with over 5,000,000 horsepower, with an output capacity of $1,000,000,000 annually and with employment for 250,000 men. It will add over 1,000,000 to the state's population and $3,000,000,000 to its wealth. It will quicken every phase of economic activity, strengthen every material resource, broaden the opportunities of every individual within the state, and give confidence and stability to industries vitally important to our prosperity. Without it we must remain stationary for the present, and with the exhaustion of our precious and limited petroleum deposits, and standing timber, steadily but surely fall behind."

Co-operation in Selling Campaign

The efforts made by the manufacturer, jobber and dealer at the last annual convention to secure recognition by the companies has been productive of results, and the trial now being given will demonstrate the effect of such co-operative work—if it leads only to a mutual understanding of the relations between the several parties in interest, including the consumer, the test will be worth while—and the ultimate person to be satisfied, the consumer, will have not one but all agencies working to give him perfect service, which is the only true and correct principle—and the resultant gain, by acquisition of the good will of the consumer, to all participants in the co-operative work, will be like the effect of the pebble thrown into the still pool; the undulating waves will in their continual widening of action, reach to the uttermost shore. Public utility men are not natural salesmen, they provoke the field only, and the trained dealer knows intuitively the prospect and its possibilities, and with fair dealing and true co-operative effort, he should be the business builder for the utility—standards fitting each utility's possibilities being his aim, and continuance of interest in his customer, even after the utility has taken up the burden of service.

Your committee recommends that member companies extend every possible aid and assistance to the jobber and dealer, in order that a full, fair and comprehensive trial be given to the plan of co-operative work in sales of appliances, that it may be finally determined on its merits, and set at rest the moot question, as to the best method of increasing sales and promoting friendly relations between seller and buyer.

Taxation

The question of taxation, always a vexed one, is bound to assume greater magnitude during the coming year, and although the fallacious argument is used that burdens of the same are passed on to the consumer, the fact remains that any undue burdens of taxation must be absorbed out of the net of each company; and it also is in the interest of an economical state administration, that taxes should be kept at as low a rate as is possible. Steps should be taken by all members of this Association by such means as lie within their power, to resist further advances in an already heavy rate, by such alliance with other organizations as will tend to maintain taxes, on a parity with other property, and to reduce the onerous burdens that public utilities are now forced to carry.

WAR SERVICE ENGINEERING PROBLEMS

(Few more important discussions have ever taken place in the history of electrical achievement in the West than that which developed at the engineering sessions of the Pacific Coast Section, N. E. L. A., convention at Del Monte. A portion of the first afternoon's meeting alone is included here, the remainder to be given in the next issue of the Journal of Electricity. The important contribution from D. M. Folsom on the present fuel oil situation, and the comprehensive paper by L. S. Ready on the hydro-electric situation in California, as viewed by the Railroad Commission, are both vital contributions to the problems which confront the industry in the West, and brought forth much that was interesting in open discussion.—The Editor.)

The first session of the Engineering Section, under the chairmanship of J. E. Woodbridge, was devoted to a consideration of the several vital problems that face the electric light and power companies as a result of the war. This was introduced by the engineering committee's report (p. 400, April 15th issue, Journal of Electricity).

Report from Northwest

The chairman read a telegram expressing the regret of Geo. E. Quinan, chairman of the engineering committee of the Northwest Electric Light and Power Association, at his inability to attend the meeting, and announcing that the association would be represented by F. D. Nims of the Washington Coast Utilities Company of Seattle, and H. H. Schoolfield, electrical engineer for the Pacific Power & Light Company of Portland.

Mr. Nims and **Mr. Schoolfield** told of the common interests of the two associations and also explained a few of the conditions peculiar to the Northwest, including the use of powdered coal and hogged fuel, results that have already been accomplished as regards tying-in of transmission lines, and the general use of turbines instead of impulse wheels. The power requirements of the shipyards have in part been met by improving the diversity factor through arranging different times of starting shifts at work.

Water Power Discussion

F. H. Fowler, district engineer for the Forest Service, and consulting hydro-electric engineer for the U. S. Fuel Administration, gave a lantern-slide lecture on "Possible Water Power Developments in California, Nevada, Arizona, and New Mexico." This graphically displayed the necessity for new hydro-electric development because of the shortage of fuel oil, and briefly analyzed a number of feasible water power developments. The paper will be subsequently published in full in these columns.

The discussion on Mr. Fowler's paper was combined with that on H. A. Barre's paper on "Power Resources in Southern California" (p. 330, April 1st issue, Journal of Electricity), and "Joint Operation of Power Companies" by J. P. Jollyman (p. 402, April 15th issue, Journal of Electricity).

H. F. Jackson stated that three years ago the proper proportion of installed steam relay capacity to hydro-electric capacity was 20 per cent and asked if that ratio still held. **F. H. Fowler** cited the satisfactory operation of the Pacific Light & Power Corporation with a 15 per cent ratio. **C. O. Poole** of the Southern Sierras Power Company stated that the cost of fuel was the determining factor to be taken into consideration, and that 20 per cent was far too high under present conditions. **F. H. Fowler** stated that no general rule could be adopted, each system constituting an individual problem.

Shortage of Fuel Oil

D. M. Folsom, Federal Oil Director for the Pacific Coast, contributed the following important information:

It is a well-known fact that the consumption of California oil has been in excess of production for two and a half years; but the seriousness of the present situation is not thoroughly appreciated by oil consumers. A complete survey of the commitments and resources of all the marketing oil companies in California, made in the last month, has developed the fact that the present available supply of fuel oil will be entirely exhausted within a year. This is based on the assumption that the present ratio between production and consumption will be maintained; and also on the assumption that it will be possible to pool all the stocks and transporting facilities. In other words, this is the most favorable picture, and a critical period may be reached in much shorter time than one year, by reason of a decline in production or an increase in consumption.

As indicating the possible decline in production:

Jan. 1, 1916—Approximately 6500 producing wells; average daily production, 37 barrels.

Jan. 1, 1917—Approximately 7300 producing wells; average daily production, 35 barrels.

Jan. 1, 1918—Approximately 8200 producing wells; average daily production, 32 barrels.

These figures show the annual decline in the daily production from individual wells, and show the necessity of intensive drilling to maintain production.

As the most productive oil lands in the state are now involved in litigation, and therefore not available for drilling, the opportunity for increased production is limited to two relatively small fields in Southern California. The figures of the State Mining Bureau show that during 1917 approximately 1000 new wells were started in California. During the first four months of 1918 only 200 wells were started, indicating a decline in drilling operations of about 40 per cent. This will undoubtedly be reflected in a decline in production during the latter half of 1918.

In as much as approximately 85 per cent of California oil is used for fuel purposes, a shortage in oil will be immediately reflected in the curtailment of all the industries on the Pacific Coast. At the present time it is proposed to classify these industries according to a priority list which will be issued in Washington by Presidential proclamation. Under this priority list, the railroads, ships and other public utilities will receive preference. Following this, will come shipyards, munition plants and industrial organizations operating directly on government orders; and, finally, all other consumers will be grouped in a class which it is expected will be curtailed within six months. This curtailment will apply particularly to consumers served by tank steamers. In view of the seriousness of the shortage, it is not at all improbable that in 1919

many industries in California, which now are supplied with oil, will be forced to shut down or to obtain power developed from hydro-electric sources.

The convention may be interested to know that in the proposed priority list, although public utilities are given a preferential position, this applies only to service to consumers who would be entitled to oil by the priority list. In other words, it would be impossible for any industry, which is unable to get oil, to substitute for it power generated from steam, and it will probably be impossible for power companies to secure oil for carrying such part of peak load as is made up of non-essential lighting. Under the provisions of the Lever Act, which governs the operations of the Fuel Administration, the marketing oil companies are required to take out a license; and this license will prohibit them from selling oil, except under the priority list, so that the burden of proof for service will be thrown upon the power companies before they can receive oil from the marketing companies.

The Hydro-Electric Situation in California

L. S. Ready, acting gas and electrical engineer for the Railroad Commission of California, read the following discussion:

The Railroad Commission of the State of California has been and is vitally interested in the power problems confronting the electric utilities of the state. These problems are in many ways as much the commission's problems as the utilities'. We must all be actively engaged in meeting and solving the war problems with the object of winning the war.

It is the commission's desire that nothing be left undone that will make possible the adequate supply of the necessary power which the electric utilities are and will be called upon to furnish to the industries in this state in order that they may not fail to do their part in winning the war, due to lack of the power that is so essential.

A large area of the state is dependent upon the electric utilities for the production of crops, and at this time that area is materially increasing and the demand for power is becoming greater than under normal conditions. The shortage of rainfall which exists this year, and the demand for extra production of crops due to food shortage combined, means that power will be used to a greater extent than ever before.

The growth of industries, especially the shipbuilding, has been rapid, and although the utilities are not today soliciting business, they are finding that to supply the demand of those who apply is causing an equal or greater increase than in past times they could obtain by strenuous solicitation.

The real question to be solved by the financiers is the obtaining of the necessary moneys for further developments and extensions to meet the requirements. The problem of the engineers consists in increasing the efficiency of the existing systems and the joining together of the different systems with the co-operative operation of them so that every kilowatt hour of energy that can be obtained may be utilized at the highest efficiency practicable, and further, the construction of more and larger plants to meet the growing requirements.

In 1917, F. Emerson Hoar, gas and electrical engineer of the Railroad Commission, now captain in the U. S. Engineer Corps, commenced investigation with view to determining what could be done to increase the output of the electric utilities, special attention being given to those companies in the central and northern part of the state in order that the prospective demands then before the companies might be supplied with the least increased use of fuel oil.

Special studies were made of the latent possibilities of the developments of the northern companies and the various projects which might be developed most quickly, and later studies were made of the possible conservation which might be obtained by more complete interconnection and utilization of existing facilities. As the study developed it appeared that, with a steady growth of business the utilities were rapidly reaching a point where further increase of load would mean almost a proportionate increase in the use of fuel. The existing hydro-electric plants which could be used with the systems as operated, or even with complete interconnection, would not supply much additional power.

Realizing this fact, and desiring to assist as it might, the commission instituted, on its own motion, an investigation into the construction and operation of the electric utilities of the state, so as to enable it to determine the special needs of these utilities during the war emergency and in order to enable the commission to render assistance to the government, the utilities and the public, to the end that there would be no shortage of power on the part of the utilities and no shortage of service to industries in California.

As most of you are aware, these investigations brought out many important facts and the commission has issued two recommendatory orders recommending certain interconnections and additional construction by southern utilities, and in the north the transmission of power from the California-Oregon and Northern California Power Companies' systems to Pacific Gas & Electric Company.

Many of those here are familiar with the conditions, but a review of the general facts may be of interest.

Dividing the state into two general divisions as regards the production and transmission of electric energy, one covering that territory in the southern San Joaquin Valley and Southern California, which may be designated as the Southern Division, and the Northern Division constituting territory served by electric utilities in the northern and central portions of the state, we have, if we neglect the separate ownership of properties, two large production and transmission systems whose loads and output are closely equal.

The Southern Division's requirements for the year 1917 showed a total simultaneous peak load of 230,000 kw., while the northern companies exceeded this amount, reaching approximately 260,000 kw. The output for the year 1917 in the Southern Division was approximately 1,150,000,000 kwh. as against 1,500,000,000 kwh. for the northern systems. Approximately 18 per cent of this energy was produced in steam electric plants utilizing oil to the amount of 2,500,000 barrels.

Estimates have been presented to the effect that if all plants now constructed be operated to full

capacity and the further advantages of interconnection be obtained, that during the present year the amount of oil used by the electric utilities, even with the increased output, could be kept approximately the same as that in 1917, under normal conditions of rainfall.

We are, unfortunately, faced with a condition which will require a greatly increased use of oil for the production of electric energy during this year. The snowfall in the mountains is less than that occurring in 1917, and considerably below normal. In the northern portion of the state the precipitation is slightly in excess of one-half the normal rainfall at this time, while in the southern part it approaches nearer normal conditions.

It is difficult to state what the oil requirements of the electric utilities will be during the coming year, but from information so far obtained, the requirement will approach four million barrels, or possible exceed that amount.

We are faced with lack of capacity for some time to come. It will be at least five years before the Pit River development of the Pacific Gas & Electric Company could be completed, and consequently the less complete but more rapid development of the same stream proposed by the Northern California Power Company might be the more feasible, especially if the Feather River project cannot be financed. The combination of the two companies might make this possible. The less complete development might be later replaced by the fuller utilization proposed by the Pacific Gas & Electric Company and the loss amortized over a period of ten or fifteen years.

Difficulties of financing the larger developments may require the immediate development of several projects of from 30,000 kw. or less, including one on the lower Pit River, the Oro plant of the Great Western Power Company, the proposed development of the Pacific Gas & Electric Company below the Drum plant, or the addition to the Sierra & San Francisco Power Company's plant, for which the bond issue has already been authorized by the commission.

The Los Angeles Aqueduct plants will be very valuable in oil conservation if constructed as they have been planned for. Their daily load factors of 40 per cent make them especially valuable for supplying the load requirements and supplementing the hydro-electric power transmitted from long distances and supplied at load factors above the requirements of the system.

Besides these there are numerous others which can be developed and which will in time be constructed.

The emergency conditions in the supply of power facing the electric utilities in the state at the present time are due to three causes:

1. The early hydro-electric plants are fully loaded and only slight increase in output will occur under normal conditions from the existing plants and practically no surplus exists.

2. The precipitation in the mountains is considerably below normal, especially in the northern part of the state, thus resulting in a reduced available supply of hydro-electric power for the year 1918.

3. The need for the conservation of fuel oil, which is becoming more necessary each month, and the absence of new developments under construction or which may be constructed in less than one or two years time.

Mr. Fowler has placed before us vividly the wealth in power which it is possible to develop in California and the Western states. This shows that there exists in the mountains latent possibilities of power development which will more than meet the needs of the utilities of the state for a long period to come, not only to supply the regular and growing needs of the electric utilities as they now exist, but in furnishing power for the electrification of railroads. These public utilities are at present utilizing 40 per cent of the total oil production of California, while the public utilities such as gas and electric, etc., use only from 10 to 15 per cent of the total production.

We must not consider, however, that because the electric utilities of California utilize only from 2½ to 5 per cent of the oil produced in the state that what we can conserve is of little importance. The percentage is small, it is true, but to the electric utility there is a substitute not available to other oil users. It is true that even at the present price of oil, hydro-electric plants cannot be economically utilized to eliminate the oil consumption by electric utilities entirely. The electric industry must, however, do its share of the conserving, not only in proportion to its own use, but must, I believe, assist its sister utility, the gas company, which in California, especially under present conditions, has practically no other source of crude product for the production of gas. The gas utilities in 1917 consumed 2,220,000 barrels.

The growth of electric demands in California in the northern and southern districts previously referred to has, during the past year, been at the rate of approximately 25,000 to 30,000 kw. and approximately 150,000,000 kwh. per annum in each district, and it appears that this growth will continue or possibly increase at a greater rate owing to the increased price of fuel oil and other power producing fuels, as well as increasing demands. To meet this demand and not greatly reduce the use of electricity to non-essentials, and to prevent the rapidly increasing use of fuel oil, will require additional plant capacity of approximately 100,000 kw. in the state each year.

At present there is practically no construction work in progress for the building of additional hydro-electric plants, and the quickest that can be made will require at least 12 months, although some small increase to various utilities can be obtained in shorter time by prompt action and some economies made on existing systems. We are, however, behind in the developments, some estimating as much as two or three years. This is due not only to lack of construction within the past year or so, but to the increased price of fuel oil and demand for conservation which has made it economical to have a larger percentage of hydro-electric capacity than formerly.

War Finance Bill

R. H. Ballard briefly summarized the provisions of the War Finance Bill as applied to public utilities. Seven-eighths of the authorized bond issue of three billion and the capital of five hundred million dollars to be contributed by the government and eventually sold to the public through bond houses, will be loaned through the banks. To secure 100 per cent advance, the banks must deposit 133 per cent in securities

backed by their personal obligation. One-eighth of the capital, about $437,000,000, will be allotted to going concerns whose business is necessary or contributory to the conduct of the war, 125 per cent of the loan being deposited in the form of securities. It is a question yet to be decided whether public utilities will come under the latter category, though the dependence of all industry on electric power will at least entitle central stations to secure the necessary capital through the banks.

Hydro-electric development will enable a large saving in fuel oil greatly needed for shipping. It is estimated that 16 per cent of the entire oil production of the nation will be required by the 300 destroyers to be built, and 25 per cent by the merchant ships and the navy. This should convince both the Shipping Board and the Fuel Administration of the necessity of new water power developments.

Much power is also required to irrigate land used to raise foodstuffs, a factor of interest to the Department of Agriculture, which supervises the production, though not the distribution and consumption of food, the latter function being controlled by the Food Administration.

The War Industries Board has the duty of finding locations and facilities for munition and shipbuilding plants and also censors orders for equipment going to non-essential industries. On the Atlantic seaboard there is an estimated shortage of 800,000 horsepower for strictly war industries, and it is possible that 250,000 horsepower of equipment now on order for ordinary requirements will be taken over by the board. California's example in the interconnection of power systems, both steam and water power, will undoubtedly be followed.

Thus there is hope that the $90,000,000 needed to develop from 600,000 horsepower in California may be obtained through these channels, especially as the formation of the War Finance Corporation followed McAdoo's suggestion for public utility needs in refunding old issues and providing capital for new construction.

H. F. Jackson asked that further discussion be contributed on the subject of steam relays.

P. M. Downing of the Pacific Gas & Electric Company, pointed out that, great as is the importance of saving oil, even greater is the problem of meeting the demand for power until additional hydro-electric capacity can be installed. There is an abundance of potential water power awaiting development as soon as capital is available. New hydro developments have not kept pace with the increase in load for several years past because the investment has been made so unattractive to capital. The oil shortage merely accentuates the water power shortage.

As five or six years will pass before the larger developments can be completed after capital is made available, work should be started on the smaller projects as soon as money is provided through government aid. These should be rushed to completion as rapidly as possible. What little advantage is being gained by interconnection is only temporary and any further curtailment in fuel supply will compel that some of the present power load be dropped.

John Hood of the General Electric Company discussed the fuel saving that would be accomplished by railway electrification. The efficiency of a steam locomotive is one-third that of a steam electric power plant; one-tenth of the locomotive's power is employed to haul the fuel it burns; over congested roads a steam locomotive can move only half the traffic that can be handled by an electric locomotive. The electrified road has proved its economy in terminals, tunnels, and especially over mountain grades where an abundance of hydro-electric power is close at hand. Our unpreparedness for war has been paralleled by our unpreparedness as regards railway electrification. Definite steps should be taken to remedy this situation wherever electrification is feasible, as thereby a greater fuel saving can be effected than by correction of any other single factor.

S. J. Lisberger urged that every possible small economy be practiced during the two years that will pass before even the small projects can be completed—that daylight saving be extended throughout the entire year, that steam economies and heat insulation be adopted in steam power plants, that radiators be turned off instead of windows opened when rooms are too warm, and that every effort be made to conserve oil.

E. A. Quinn of the San Joaquin Light & Power Corporation told of economies effected by the interconnection of his company's lines with those of the Mount Whitney Power & Electric Company. **Ed. Whaley,** Northern California Power Company, and **W. M. Shepard,** California-Oregon Power Company, likewise described how the interconnection of these two companies is to be accomplished. The building of a 95 mile tie-line will supply 8000 to 12,000 kw. from the Copco plant to the northern territory and release power for delivery to the Pacific Gas & Electric Company at the southern end of the Northern California Power Company's lines. The cost will be about $750,000, which will virtually transfer 8000 kw. 230 miles with transmission losses not to exceed 16-18 per cent.

E. R. Northmore of the Los Angeles Gas & Electric Company deplored the use of 50 cycle equipment by the Southern California Edison Company and the Los Angeles Aqueduct plant when 60 cycles has been selected as the standard throughout the rest of the state. He suggested that, since this difference would not be tolerated if all systems were under one management, it be changed so as to meet the necessities of the present emergency.

C. O. Poole of the Southern Sierras Power Company approved of this suggestion, though the difficulty is partly mitigated by the beneficial condenser effect accomplished by the installation of synchronous motor driven frequency changer sets. The practice of changing generator speeds to vary frequency entails too great a loss of efficiency.

H. A. Barre of the Southern California Edison Company made the point that a steam plant, as a part of a hydro-electric system, has two main functions. The first is to carry the peaks which cannot be carried by water power because of the tremendous idle investment necessary to provide power for only a short time.

The second is to carry the base during periods of low water. The steam plant also carries a growing load until it can be capitalized in the construction cost of hydro-electric development. Mr. Barre thinks that future fuel requirements of the Pacific Coast will be met by Alaska coal, thus conserving the oil for more valuable purposes. He forecasted a great industrial development based on the development of iron ores in California smelted with Alaska coal.

He pointed out that the immediate development of Los Angeles Aqueduct power and the Kern River No. 3 plant would respectively add 100 million and 180 million kw. hrs. annually within two years time. He urged the necessity of starting these developments at once.

J. P. Jollyman stated that interconnection of power companies has minimized power waste in Northern California. Money costs have been subordinated in order to obtain maximum utilization of available power.

Max Thelen, president of the Railroad Commission of California, extended the greetings and sympathetic interest of the commission in the proceedings. He appreciates that the power shortage problem is mainly one of finance and expressed confidence in the outcome.

Friday morning's discussion carried with it some vital hints for the conservation of fuel and water, as well as minimizing transmission and distribution losses. The point was made that steel conductors are likely to permanently displace copper in the future. There was considerable contributed discussion on standardization of insulators and insulator deterioration.

CONTRACTOR-DEALER AND JOBBERS SESSIONS

PACIFIC DIVISION, ELECTRICAL SUPPLY JOBBERS ASSOCIATION

At an open meeting held the afternoon of May 7th, to which contractors and manufacturers were invited, much of interest was brought out. A paper by J. J. Gibson, manager of the retail supply department of the Westinghouse Electric & Mfg. Company, from Pittsburg, proposed a single order selling plan which provoked considerable discussion, during which the various viewpoints of the jobbers on the Goodwin plan were expressed. Further routine business concluded the meeting.

CALIFORNIA ASSOCIATION OF ELECTRICAL CONTRACTOR-DEALERS

The California Contractor-Dealer Association days at the joint convention were crowded with developments of much importance to the future welfare of the contractor-dealer.

At the Wednesday afternoon session, which was in reality a continuation of the adjourned quarterly meeting held at Sacramento last January, the members after listening to a most frank and detailed exposition of the National Association of Electrical Contractors and Dealers, its aims and accomplishments, voted unanimously to join the National Association as a state organization, the action of the meeting of course, being subject to a referendum vote of the entire membership.

The present officers were voted to hold office under the new constitution and by-laws until the end of the present calendar year. J. W. Redpath, the present secretary-treasurer, was unanimously re-elected to that office.

Thursday morning was given over to an open meeting to afford the motor dealers an opportunity to meet with the manufacturers and jobbers for a mutual consideration of the problems affecting the motor industry.

The margin of manufacturers is small, it was shown, and even if they would it is probable that they could not legally combine to raise the price, so ways and means of increasing rate of turnover and volume of business were suggested; studying requirements in special lines such as the printing trade, woodworking shops, was advised. Purchasers will prefer dealing with local men rather than manufacturers if the former render service. Motors should not be sold to get wiring jobs and the awarding of agencies to unscrupulous dealers was also condemned. Chairman Frank J. Somers, San Jose, went on record as opposed to any more closed meetings.

Among others who spoke were:

R. A. Balzari, Westinghouse Company, San Francisco.
W. S. Berry, Western Electric Company, San Francisco.
A. J. Myers, Wagner Electric Company, San Francisco.
P. H. Affolter, Garland-Affolter Engineering Company, San Francisco.
F. S. Thomas, Valley Electrical Supply Company, Fresno.
C. L. LeMoree, Westinghouse Company, Los Angeles.
C. F. Butte, Butte Engineering and Electric Company, San Francisco.
C. S. Renwick, Richmond.
Frank E. Doerr, San Jose.

T. E. Bibbins, Pacific States Electric Company, San Francisco, urged that dealers get together and agree on improvements desired in the present plan. Manufacturers would welcome a uniform plan, he said, but while all sections of the Coast demand different action no changes whatever could be expected. These were, in fact, the sentiments of the meeting. Manufacturers were asked to appoint a representative committee and the dealers decided to do likewise in order that uniform plans might be agreed upon and steps taken to put them into effect.

A session devoted exclusively to the interests of motor men proved so helpful that a permanent motor section was suggested. Papers on motor sales were presented at this session by:

F. W. Buzzell.
C. E. Ingalls, San Francisco.
H. P. Courtright, Fresno.
F. E. Boyd, General Electric Company, San Francisco.

The chief topic was relations between manufacturer and agent and how to build up motor business.

In answer to the complaint that the motor business did not pay, Mr. Boyd affirmed that it did pay if properly managed.

DISCUSSIONS ON RETAIL SELLING PRACTICE

(Much that was worth while in practical suggestions was brought out in the Commercial Section sessions at the Pacific Coast N. E. L. A. convention. A lively and valuable discussion on the paper "Retail Selling Practice" occupied the major part of the Friday morning discussion, and is reported here. The entire program could not here be included, owing to lack of space, but will be continued in the June 1st issue of the Journal of Electricity.—The Editor.)

COMMERCIAL SESSIONS

The commercial sessions were held on Friday under the direction of Chairman R. M. Alvord, who, in his introductory remarks, recommended that the selling force of the industry be devoted to placing electrical equipment and service in those places where they will release labor, fuel and money that can be used to help win the war.

RETAIL SELLING PRACTICE

L. H. Newbert of the Pacific Gas & Electric Company abstracted the paper on "Retail Selling Practice" (p. 351 and 412), tracing its four divisions: (1) the store, its location, rent, arrangement and management; (2) the cost of doing business; (3) selling methods; (4) advertising.

J. C. Rendler of the Southern California Electric Company of Los Angeles contributed the following written discussion:

While I believe that the gentlemen who wrote this paper are sincere, I think in their desire to make it look good on paper, they have exaggerated the conditions in some instances. I believe in these papers everything should be painted in its natural color. That is what I have done as it appears to me, and I trust that in any criticism I may make, the authors will not take it as being personal.

Retail selling practice naturally begins with the store, and as the store is the first subject on the paper, the store will be the first to get the bayonet. The general suggestions for location are beautifully written and probably applicable some place in the United States or in the world, but, from the writer's experience in California, they are decidedly impractical. I have never seen an electrical dealer who has made a success or even started on a fair road to success in the shopping district, and I have seen quite a number try. The cost of operating a "specialized business" with its limited gross business, is from 30 to 40 per cent. The department stores do business on a smaller overhead on account of their large volume. If some mathematician will show me the rule whereby an electrical dealer can rent a store in the best shopping district, with the rent, furnishing, help and other luxuries that go with the location, and help to build that 40 per cent overhead, and can make a success of it when the maximum discount allowed by the manufacturers of electrical devices is but 30 and 7 per cent on all of his principal lines, then I will confess that two and two do not make four.

If you try to locate in the shopping district, you are naturally near a department store, who, with its full page ads appearing daily in the newspapers in the same place, have educated the women buyers to look for their announcements. With only a small corner of that full page devoted to electrical appliances they can draw all the business away from the dealer who can not afford to spend enough money for advertising to counteract the ads of the department store.

While on the subject of the department store, let me say I do not believe they should have a place in the Contractor-Dealer organization. I further believe if the contractor-dealer is to become a factor in merchandising, he must be given an opportunity to grow, and grow he never can, so long as department stores, hardware stores, drug stores, and grocery stores are considered the proper channels for the distribution of electrical appliances and devices. Another reason why the dealer has never grown to his proper proportion is the power company, although there has been marked improvement along this line during the past year, and this meeting is further indication of what is yet to come.

Getting back again to the cost of doing business, we see a list of fourteen rules recommended for figuring cost and profits. Eleven of these rules deal in figuring your cost; number twelve tells you to prove it by your books, and thereby know your cost of doing business for the year; number thirteen says to deduct this percentage from any article sold and find out whether or not you made a profit on that particular article. And then number fourteen — here is the real thing. Go over your several articles and put the selling price on a profitable basis. Again I say, how can the dealer do this, when the manufacturer fixes the retail price, advertises the retail price, and says to the dealer: "You get 30 and 7 per cent discount from those prices." Imagine a dealer asking $5.50 for an electric iron that appeared in the Saturday Evening Post at $5.00 and underlined "for sale at all electrical and hardware stores."

Stock turnover and perpetual inventory are two very great essentials in the conduct of a business, and their use should be very highly recommended. However, to keep these two files correctly will require one or more persons on the overhead, according to the amount of business done. In these days of conservation, the elimination of non-essentials, and the ultimate winning of the war, which must and will be done, it behooves the dealer to watch very carefully all items of overhead.

Selling Methods—I would imagine the suggestions under this heading to be for the benefit of beginners, as they deal with the A B C's, but since the electrical dealer generally is considered a beginner, the suggestions are very appropriate. I find the dealers in the territory I hail from practicing all the modern merchandising features that are practiced by any merchant in any line of business, large or small, and I believe a few features that nobody else ever thought of.

I was very glad to see the paper contained some practical suggestions on advertising, as I believe every dealer is more interested in this phase of merchandising because it is so much more difficult to see returns from it than from his window or direct solicitation. I would like to see the dealers of the state compile a record for a given period of time, say one year, in which to determine a fair average of expenditure for advertising on a given volume of business. I understand this information is available in other lines of business, but I have no knowledge of anything of the sort having been done in electrical merchandising. It is a lamentable fact that thousands of dollars are thrown away on advertising each year, simply because the copy was poorly written. There are advertising experts in nearly every city who will write your copy for a very nominal fee, and make it draw where you couldn't get a nibble.

Another thing these experts do is to make it easy for you to turn down unprofitable mediums that run you to death. Simply tell them John Doe handles your advertising and they will have to see him—and he does the rest.

In closing, let me say the electrical dealer (given an opportunity) will make a place for himself in the merchandising field that you will be proud of.

H. W. Kimball, contractor-dealer of Oakland, Cal., disagreed with Mr. Rendler, arguing that a good location is the best salesman you can have on the job. He welcomes the enlightened and fair competition of department and hardware

stores. He believes that the establishment of electrical specialty stores in the retail district will discourage the department stores and other from handling electrical business. He allows only 2 per cent of his sales for advertising.

J. C. Holbrecht, electrical dealer of Sacramento, likewise disagreed with Mr. Rendler. However, he wants specific information on the proportion of gross sales that should be allowed for rent. He would tie-in and benefit from department store advertising by showing in his window exactly what the department stores show in theirs, and at the same time.

C. E. Ingalls of the Crocker-Wheeler Company contributed the following:

This paper has given us some very practical points on the selection of the location of a store. Having determined the block in which the store is to be located, there is, the paper says, sometimes a choice of location within that block. I would point out a few rules that would prove of value in choosing between different sites.

The value of a corner lot is a question much debated by expert real estate appraisers. The simplest, reliable rule is the Lindsay-Bernard rule, which is as follows:

Figure the value of the lot as an inside lot on the main street. Then find the value as an inside lot on the side street. The sum will be the minimum value of the corner lot.

In choosing between two lots of different depths, there can be used any of the several authoritative so-called depth curves. The simplest rule, however, is a rule used by New York City assessors. It is called the 4-3-2-1 rule. The rule is that the front one-quarter of depth is worth 4/10 of the total. The next one-quarter of depth is worth 3/10 of the total. The next one quarter is worth 2/10, and the rear one-quarter is worth 1/10.

Sometimes it is difficult to determine the value of an irregular lot; for example, an "L" shaped lot, by which I mean a lot made up of a regular lot, with the addition of the rear of the adjoining lot. This value can be determined by valuing the regular lot, and adding to it the value of the rear, as determined by the 4-3-2-1 rule.

Another case is a lot that is all or in part a triangular lot. Here the rule is that the triangular part has the value of a rectangle of depth equal to one-half the altitude of the triangle.

The strongest side of the street tends to be that backed by the best residence district. Also, the south and west sides tend to be more valuable.

Streets running at acute angles make long crossings, which are detrimental to store properties.

Lack of continuity is detrimental to stores.

Traffic tends to be weaker in long than in short blocks.

Street cars are beneficial to store streets, except to fashionable shops.

Louis Levy, electrical dealer of San Francisco, contributed the following:

In the discussion of a paper of this kind, it would require considerable more time than I have given me, to tell the different items that I might agree or disagree with.

The paper or report as a whole is one that every dealer, whether large or small, would be well repaid by reading, but the trouble with us dealers, when it comes to a matter of this kind, is that we "are too busy, and haven't got the time," and it perhaps applies to myself as well as to others in the business, for, while I read both issues of the Journal containing the printed report, it was not until I knew I was to talk on this report that I read it carefully enough to appreciate how much real information it contained.

The section on "Cost of Doing Business" interested me more than any other section, and it is on this part of the report that I will confine my few remarks.

I do not find it practical to keep a perpetual inventory, in detail on cards, as suggested, but I do figure cost on every sale and piece of work done and at the end of the month am in a position to say what my stock is worth in total—dollars and cents. I have tried the cards for the movement of stock but found that the added cost of labor did not justify the information received, and as I check every invoice before it is paid, so as to follow the purchasing of the goods, I feel that a business of less than $50,000 a year is not big enough to carry this item of overhead.

I find that there are a number of items in my stock that are necessary to have so as to live up to the reputation of having everything electrical, and it is not practical, just because some items do not turn over every four months or so, that they should not be carried. For instance, Christmas tree outfits and lamps. I always have some on hand, and during each year have a limited call for them and I would not feel justified in selling out completely on December 26th. The same applies to fans. While we never have a large demand for them, we always have a few all through the year.

It must be remembered that the dealer is not in a position to make the resale price of the goods which go to make up the volume of his sales. These prices are made by the manufacturer and our problem is how to increase sales with a minimum of overhead. My overhead in March was 0.332, and my records show that in April, May and June it runs higher. My problem is now "how to increase sales with my present force," not to increase my force to increase my sales. My cash sales last year in these three months numbered 700 per month of 95c. each. The number of sales was below the average of the entire year, which was 935. The amount of each sale was the same.

To my way of thinking, I have to be careful just how far I go during this slack period, for fear I cannot make up when the harvest comes.

The cost of getting this information is considerable, and yet I could not feel satisfied to do business any other way. But I know that with the office force employed by some of the dealers in our city they cannot begin to get the information absolutely necessary to tell them where they stand. And again, it requires more than a bookkeeper to get the proper system started, and I believe that the Commercial Section of the N. E. L. A. is certainly doing the industry great good by making the dealer realize the importance of knowing "The Cost of Doing Business."

F. C. Green of the Oregon Association of Electrical Contractors and Dealers, asked for information on merchandising methods of California. He suggested employing an expert window dresser to put in the displays of a number of stores in the same city.

G. E. Arbogast, electrical contractor from Los Angeles, made the point that a good location is merely a trade opportunity. He also believes that the retail business must be supplemented by contracting work, stating that no one can profitably engage in an exclusively electrical retail business.

M. L. Scobey, electrical dealer from San Francisco, named advertising and location as the two essentials to the success of an electrical store. High rents in San Francisco, and low profits, will not permit an electrical store to exist in the shopping district. A comprehensive advertising campaign is also too expensive for any San Francisco dealer to carry on.

G. B. Furniss, Pacific Gas & Electric Company, advised the smaller dealer in outlying districts to conduct a house-to-house canvass in his neighborhood and thus gain the advantage of personal acquaintanceship.

H. W. Kimball of Oakland, in answer to a question by W. H. Gribble, stated that 23 per cent represented his overhead cost of doing a retail business. He agreed to furnish a detailed analysis of the items that make up his overhead.

W. L. Frost of the Southern California Edison Company welcomed the day when the appliance load will be built up by dealers instead of central stations. Brief remarks were made by H. N. Sessions of the Southern California Edison Co., and by Lee H. Newbert, in closing.

WHAT WESTERN INVENTORS ARE DOING

BY WM. K. WHITE AND H. G. PROST

(Many of the big electric companies whose business is largely based on patents owned by them, have listed these at nominal figures in their balance sheets. In view of the provisions of the excess profits tax, however, which permits patents to be included in assets, this practice will probably be discontinued in favor of a valuation at approximate value. The elements which must enter into such a valuation are here considered for the convenience of those who deal in patents from any angle. The authors are prominent patent attorneys of San Francisco.—The Editor.)

THE COMMERCIAL VALUE OF PATENTS

The proper valuation of a patent is an intricate problem, but it often becomes necessary to fix such value with a fair degree of accuracy. In the past, some of our large patent owning corporations have adopted the policy of carrying their patent assets in their balance sheets at nominal values, but the War Excess Profits Tax Law, which permits patents to be included in assets, thereby reducing the amount of the tax, makes it advisable for all corporations to value their patents at their approximate value. The elements which enter into the solution of the problem of the value of the patent are many and some of them are to a great degree indeterminate. The past and present state of the particular act to which the invention relates, the time that the patent has to run, the probable demand for the invention, the possible future state of the art and the scope of the monopoly granted by the patent are all elements which enter into the problem.

Those corporations whose business is based upon patents and whose net earnings largely arise from such patents are usually protected by a group of patents, usually consisting of the basic patent and many patents on improvements made in the original invention, while the basic patent is still in effect. These improvement patents are such that a hold on the larger markets of the future is practically assured, and this is added to from time to time by the acquisition of other patents on new developments, so that patent protection can be built up and maintained independently of the life of any particular patent. At the expiration of the basic patent, the invention disclosed therein is open to the public, but usually the improvements which have been made and patented during the life of the basic patent, are such that even after its expiration, the corporation maintains a practical monopoly of the field.

To arrive at the value of a patent or a group of patents owned by a corporation or business, it has been assumed that the owner of the patent or patents will secure at least 50 per cent over the net earnings that would be possible if no monopoly existed, that is, one-third of the net earnings are due to patent protection. The value of the patent protection at any specified time would be the present worth of an annuity, on a 6 per cent basis, for the unexpired portion of the 17 year life of the patent, the annuity being one-third of the net earnings and fixed charges of the business. Patent protection exerts its controlling influence on all of the industrial arts and exacts tribute from all. The total amount of the tribute thus collected would be stupendous to contemplate. It might appear at first thought that this system of exacting tribute from the industries would hamper and retard them, but, as a matter of fact, the contrary is true and the effect has been to produce a great stimulus to industry by providing continual improvements, looking to both better product and lesser cost of manufacture.

Some corporations, as we have noted above, have carried their patents in their balance sheets at a nominal figure. Taking the figures from the balance sheets of 1916, we find the Ajax Rubber Co., the Goodyear Tire and Rubber Co., the Packard Motor Car Co., and the General Electric Company, valuing their patents at $1.00 and the Victor Talking Machine Co., at $2.00. It seems remarkable that the existence of the vast amount of value represented by the hundreds and possibly thousands of patents owned by these corporations should be concealed. Patents are property and property of such an important nature, that it should not be considered good business policy for any corporation possessing a large number of valuable patents to belittle or secrete them in the annual report. We feel, however, that the Excess Profits War Law will alter this situation tremendously.

Other corporations have endeavored to fix the value of their patents at their approximate value and the 1916 reports of the following corporations show substantial patent values:

American Cyanamid Company	$ 3,543,475
Casein Co. of America	4,555,168
Diamond Match Company	2,000,000
Electric Storage Battery Company	11,000,000
Gilette Safety Razor Company	900,000
Lanston Monotype Company	4,372,046
Mergenthaler Linotype Company	4,000,000
Waltham Watch Company	4,502,000
Ward Baking Company	6,000,000

Some corporations have included their patents, trade marks and good will in one item as follows:

United Drug Company	$ 9,974,213
Advance-Rumely Company	14,172,305
American Pneumatic Service	7,243,597
General Railway Signal Company	3,000,000
Griffin Wheel Company	6,950,000
International Motors Company	6,153,266
Maxwell Motor Company	26,500,000
Studebaker Corporation	19,807,277
Underwood Typewriter Company	7,995,720
Submarine Boat Corporation	7,332,337
Worthington Pump & Machinery Company	7,567,073

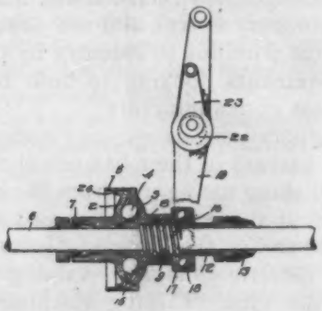
These lists include only a few of the large patent owning corporations taken at random. There are thousands of others, both small and large; some are large as given above, and others being small local manufacturing establishments, and the actual value of the patents owned by these companies is tremendous. The actual value of all patents now in existence cannot be calculated, because many of the late inventions, which in future years will have enormous value, at the present have little or no earning capacity. As an instance, there is one patent of which we have definite knowledge, which is now three years old and which as yet has earned nothing, but licenses which have recently

been signed bid fair to bring a return of $500,000 this year; another patent will bring a return of $10,000 this year with the prospect of this royalty increasing by leaps and bounds in each succeeding year.

NEW IDEAS FROM THE WEST

Speed Governor

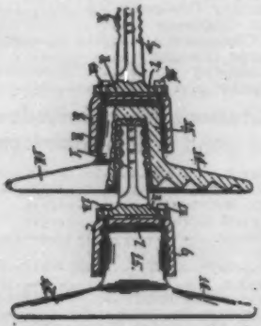
Patent No. 1,257,918, issued to Walter G. Noack of Stockton, Cal., and assigned to Tractor Motors Company of Benicia, Cal., shows a new form of governor which is particularly adapted to control the speed of internal combustion engines. The governor consists of two concave plates arranged in juxtaposition so that the height of the enclosed chamber de-



creases outwardly. Arranged in the chamber between the plates are a plurality of steel balls, which are thrown outwardly by centrifugal force as the plates are rotated, thereby causing a separation of the plates. One of the plates is fixed to a shaft and the other is slidable longitudinally along the shaft and is normally held in place by a spring. The amount of movement of the latter plate along the shaft is determined by the speed of the shaft and the plate is connected to the engine throttle, so that the throttle opening is closed when the speed becomes excessive. Governors of this type have a tendency to hunt and this tendency is overcome in the present governor by retarding the entrance and discharge of air from the chamber, thus producing a damping effect on the governor.

Insulator

Patent No. 1,257,516, issued to Earle A. Muckey of San Francisco, California, discloses a new form of insulator assemblage for electrical construction. This insulator as-



semblage consists of an insulator pin having a base flange to which the head of an insulator bell is bolted, the meeting faces of the large flange and the bell head being provided with interfitting tongues and grooves.

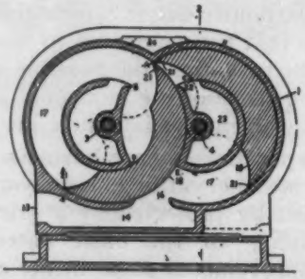
Refillable Fuse

Patent No. 1,257,418 shows a refillable fuse, which was invented by Basil L. Spurr and Frank A. Tittemore of Richmond, California. This fuse consists of a cylindrical insulating shell having a longitudinal socket formed in its wall and extending inwardly from the end of the shell. Arranged on the end of the shell is a removable contact member which is provided with an extension lying in said socket to prevent rotation of the contact member. Arranged on the other end of the shell is another contact member. Secured to the first con-

tact member is a fusible element which lies within the shell and which is electrically connected with the other contact member.

Rotary Pump or Compressor

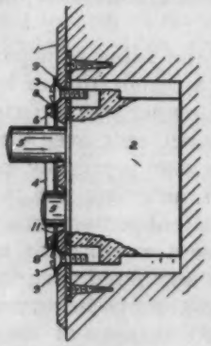
Patent No. 1,257,744, issued to Robert Schorr of San Francisco, Cal., shows a new form of rotary pump or compressor. This pump consists of a housing in which is arranged two hollow semi-cylindrical rotors arranged on parallel



spaced shafts and rotatable in opposite directions, one arranged to act as a valve for the other. Disposed concentrically with respect to each rotor are stationary semi-cylindrical outlet chambers, with the walls of which the rotors form running contacts. The liquid enters the housing from below, one of the pump chambers being always open, and is forced from the pump chambers by the rotors.

Attachment for Electric Switches

Patent No. 1,257,473, issued to Maxwell C. Frank of Piedmont, Cal., shows an attachment for electric switches which has fundamentally the same object in view as the constructions shown in former patents to this inventor recently re-



viewed in this column. The present invention relates to push button wall plates and embodies the use of a transparent plate having a coating of luminous material on its bottom face. The plate is held in place by a flexible frame which is backed by a yielding shim so that the plate is resiliently supported.

Lest we forget—

May 20-27—Red Cross Week

SPARKS—Current Facts, Figures and Fancy

(An improved insulating material is being made from fish refuse, valuable potash is being obtained from the residue dust of cement plants—in short, the utilization of waste products has become the keynote of the times. The shortage of metals and other essential materials is making itself more and more felt. Platinum is so rare that its use in any but war industries is being given up. In Germany they are experimenting on substitutes for gasoline. Nothing has yet been found, however, which will serve as a substitute for labor in the present shortage—except perhaps an electrically run machine.—The Editor.)

The old laborious method of cleaning the hulls of warships is being replaced by electricity. Formerly, it was customary to allow 170 to 200 man-days for the work, but several electrically driven machines have been found to do the work far more expeditiously.

* * *

According to the Scientific American, a new substitute for gasoline is being tried out in Germany. One part benzol and two parts alcohol are used, it is said, with good results. An ordinary carburetor may be used, and in a test a car ran 4.56 miles on one pint of the mixture.

* * *

A new Danish process by which certain by-products, valuable for electrical insulation, may be made out of fish offal, is soon to be put to practical test in Skagen, Denmark. The most important of the new products is called "cornimit," which, it is claimed, excels galalith as an electrical insulating material.

* * *

The motion picture film for advertising is being used not only by the individual firm but by trade organizations for international propaganda. A moving picture exhibition of British industries is now organizing a tour of Western Europe, North and South America, to illustrate the manufacture and use of British made goods.

* * *

The shortage of labor from which all industries are suffering is partly due to enlistment in the army and partly to the call of war industries. Including the 250,000 volunteer workers now being assembled, the United States will soon have 450,000 skilled men actually at work in shipyards. In 1916 the total number so employed was 44,962.

* * *

The periscope is now being used in the deadly wilds of the power plant. In order to read the temperature of the oil in transformers in a Western plant, it has been necessary in the past to use a step-ladder to reach the thermometer mounted at the top of each unit. By using a simple periscope on each transformer, it is now possible for the attendants to read the thermometer scale from the floor.

* * *

By way of utilizing one of the largest national resources of Norway, namely, the waterfalls and the electricity made therefrom, electric automobiles are now being discussed for all purposes. Heretofore gasoline cars have been practically the only ones in use in the country. For several months past no gasoline has been received, and as there are but few electric cars in Norway, automobiles have practically disappeared. There is a great demand now for American electric cars and storage batteries and other apparatus.

* * *

An electric precipitation process has enabled Western cement workers to obtain potash from the residue dust. In one case a year's trial under practical operation has resulted in the rather astonishing result of having a greater income from potash than from cement. Operating costs show conclusively that the process will be profitable at pre-war prices and that a supply of potash for fertilizer as well as ammunition, is now assured.

* * *

Flour is not so perishable a cargo for danger zone shipment as is generally believed. In a recent experiment, a sack was submerged in the ocean for 67 hours. It took a 98-pound weight to sink the 150-pound bag, in the first place, which would have supported 75 pounds on top of the water, it is estimated. When lifted the bag scaled 155 pounds. It was dried for four days and yielded 120 pounds of perfectly dry flour. Baked into bread, it gave perfect results.

* * *

Many of the delicate electric instruments essential to war machinery depend upon platinum for special parts. In this connection it is interesting to learn that Russia's supply of platinum is being entirely taken over by Germany. There are only between 25,000 to 50,000 ounces of the precious metal in the United States today, and Nevada, California, Utah and Oregon have turned out not more than 750 ounces a year which geologists believe can be increased to 3000 ounces.

* * *

The subject of the use of electricity to increase crops has lately been brought to the fore by the London Times, which says that a method has been devised to overcome the difficulty of expense of electrification, as applied to both the growing crops and the seed before it is sown. Installations at which farmers can have their seeds treated by experts have been erected at several centers and are capable of treating some 30,000 sacks per month. The increase of yield from seed so treated, though not so great as the increase from electrification of the growing crops, is stated to be considerable, ranging from 25 per cent to as much as 80 per cent.

America's finest record—

May 20-27—Red Cross Week

PERSONALS

J. E. Woodbridge, of Ford, Bacon & Davis, consulting engineer for the Sierra & San Francisco Power Company, has performed a distinct service to the West in the preparation of the recent engineering papers for the Del Monte convention of the Pacific Coast Section, N. E. L. A. Mr. Woodbridge, as chairman of the Engineering Section of this organization, laid especial stress on the necessity of studying methods of unusual economy in hydro-electric power production and steam electric generation. The beautiful and helpful papers that his committee presented at the convention speak for themselves and will serve as a lasting memorial to his war service ideals.

G. J. Kuhrts, manager of the Pacific Electric Company of Los Angeles, was in San Francisco recently for a brief business conference.

H. B. Vanzwoll, general manager of the Sunbeam Division of the National Lamp Works of the General Electric Co., is visiting the Pacific Coast.

E. E. Arnold, sales manager electrical department H. W. Johns-Manville Company, attended the Del Monte convention and returned East via Salt Lake City.

J. A. Harnett has resigned as electrical engineer with the Western States Gas & Electric Company at Eureka, Cal., to join the Southern California Edison Company.

P. S. Klees, sales manager Franklin Electric Manufacturing Company, manufacturers of "Franklin" lamps, Hartford, Conn., is spending a few days on the Pacific Coast.

Carl H. Reeves, Seattle engineer, has been made a major in the U. S. Engineer Corps and put in charge of construction of a large cantonment being built just across the river from Washington.

Frank E. Getts, general manager of the Electrical Engineers Equipment Company of Chicago, Ill., and wife, are recent California visitors, and were interested attendants at the Del Monte conventions.

John F. Birney of Everett, former county engineer of Snohomish county, where he held that office for eight years, has been appointed assistant engineer of Whitman county, Wash., under J. M. McCaw, county engineer.

A. J. Myers, district manager of the Wagner Electric Manufacturing Company, with headquarters in San Francisco, has returned to his home city after an interesting six weeks visit at St. Louis and other Middle West points.

Samuel Demoss and **Albert Swartz**, both Seattle engineers, have been ordered to Waco, Texas, by the war department for special study in areology and meterology in connection with the division of research in the signal corps.

Frank W. Harris, formerly locating and construction engineer of Seattle, is now in the service of the nation as captain of Company B, Forty-second engineers. He is at present located at Camp Humphreys, Virginia, where the regiment to which he is attached is being recruited for foreign service.

To help lessen the agony—

May 20-27—Red Cross Week

John J. Jackson, general attorney of the Westinghouse Electric & Manufacturing Company, with headquarters at Pittsburgh, and **Calvert Townley**, assistant to the president of the company, also a director of the Westinghouse Electrical Export Company, with headquarters in New York City, are Pacific Coast visitors.

F. H. Murphy, illuminating engineer of the Portland Railway, Light & Power Company, Portland, Ore., has been appointed by Samuel Gompers, chairman of the committee on labor of the Advisory Commission of the Council of National Defense, on the divisional committee on lighting. He has also been appointed local representative of the Illuminating Engineering Society.

J. L. Fugate of Salt Lake City has associated himself with the William A. Mullins Electric Company of Tacoma, occupying the position of sales and factory manager. Mr. Fugate was manager of the factory and fixture department of the Capitol Electric Company of Utah. This concern has 21 stores in Idaho, Utah and Montana, which were under his supervision.

James T. White has been appointed manager of the Oregon Gas & Electric Company, Medford, Ore., to succeed O. R. C. Grow, who left for Los Angeles to take the position of manager of the California Gas Company. Mr. White was formerly manager of the Oregon Gas & Electric Company at Roseburg, Ore., and was a former solicitor of the company at that office.

A. L. Anderson, electrical engineer, Federal Telegraph Company, Palo Alto, Cal.; **L. S. Blackman**, junior telephone and telegraph engineer, Interstate Commerce Commission, San Francisco, Cal.; **S. L. Chapin**, electrician and draftsman, Anaconda Copper Mining Company, Great Falls, Mont.; **B. D. Downing**, assistant engineer California Railroad Commission, San Francisco, Cal.; **V. D. Elliott**, electrical engineer, Southern California Edison Company, Los Angeles, Cal.; **S. M. Gardner**, electrical engineer Bay Point Electric Supply Company, Bay Point, Cal.; **C. E. Green**, president of the Green Engineering & Construction Company, Richfield, Utah; **W. C. Heston**, line engineer with the Portland Railway, Light & Power Company, Portland, Ore.; **Marc Holizer**, electrical expert aide, U. S. Naval Construction Office, Union Iron Works, San Francisco, Cal.; **R. S. Horth**, toll wire chief, Mountain States Telephone & Telegraph Company, Salt Lake City, Utah; **L. S. Hubbell**, switchboard engineer, Pacific Telephone & Telegraph Company, San Francisco, Cal.; **T. F. McCoy**, division construction engineer, Mountain States Telephone & Telegraph Company, Helena, Mont.; **C. F. Rose**, chief electrician, Nevada Consolidated Copper Company, Ruth, Nevada; **J. T. Thompson**, proprietor, Light Company, Portland, Ore.; and **R. A. Waite**, instructor in aerial observation, School of Military Aeronautics, University of California, have been elected associate members of the A. I. E. E.

R. M. Alvord, San Francisco manager of the supply department of the General Electric Company, as chairman of the Commercial Section, helped most materially in sounding the keynote of the recent Del Monte conventions, which proved to be a protest against the closed meeting and a higher, more generous expression for mutual helpfulness among all branches of the industry. The commercial papers were so planned as to bring out this feature of expression and the splendid results of Friday afternoon's discussion fully demonstrated the far-sighted ability of the Commercial Section chairman in preparing the papers for discussion.

W. S. Leffler, formerly assistant to the general agent of the Great Western Power Company, and secretary of the Electric Sales Service Company of San Francisco, has just returned on a ten days furlough from the aviation training camp in Texas, where he has been since December. He has been commissioned Flying Lieutenant Reserve Military Aviator and qualified as Corps d'Arme Pilot. Mr. Leffler entered the service in December, and through his special preparation as an electrical man, was able in a short time to master not only the small observation machines, but soon became a proficient operator of the largest and most modern type of fighting plane, and has been granted his lieutenant's commission.

G. R. Purvis of the Hurley Machine Company of Chicago was an interested visitor at the recent Del Monte convention.

H. L. Bleecker of North Yakima, Wash., vice-president of the Washington Water Power Company was a recent visitor in San Francisco.

H. R. Noack, having charge of Pacific States Electric insulator and hardware sales, San Francisco, spent a week in Seattle recently on business of the company.

A. J. Gladson, owner and proprietor of the Valley Electric Company, Yakima, Wash., has been spending a few days in Seattle on business.

Percy Booth of the Edison Appliance Company is making a permanent move to Chicago. In the loss of Mr. Booth, Southern California is losing one of its best known and most prominent citizens.

John A. Britton, with his wife and daughter, were in attendance at the N. E. L. A. convention. Mr. Briton's paper on "Public Policy," indeed marked perhaps the most important statement of the gathering.

Max Thelen, president of the California Railroad Commission, attended several of the sessions of the electrical conventions at Del Monte and spoke helpfully of the encouraging attitude of the commission toward public utility policies.

D. M. Folsom, Fuel Administrator for California, was unable to be present at the Pacific Coast Sestion N. E. L. A. convention of last week, but sent a most interesting letter on the present fuel shortage, which is reproduced elsewhere in this issue.

T. E. Bibbins, president of the Pacific States Electric Company, was the efficient director of the convention banquet at the Del Monte convention—one of the pleasant memories which will long remain with those fortunate enough to be present.

Samuel Kahn of the Western States Gas & Electric Company of Stockton, was chosen president of the Pacific Coast Section, N. E. L. A., at the recent convention. The well-known executive ability of Mr. Kahn augurs well for the association's coming year.

H. H. Schoolfield, of the Pacific Power & Light Company, Portland, Ore., represented that company at the Del Monte convention, in place of Mr. Merwin, who was unable to come. Mr. Schoolfield most helpfully reported on Northwest conditions at the Engineering session.

John R. Brownell, superintendent of safety, and **Robert Eltringham,** electrical engineer for the California Industrial Accident Commission, were in attendance at the Pacific Coast Section, N. E. L. A., convention to represent the safety interests at convention discussions.

W. L. Goodwin of the General Electric Company, advocate of co-operation in the electrical industry, was one of the most forceful speakers at the recent Del Monte convention. Mr. Goodwin came all the way from New York City to bring his message of co-ordination to the California electrical men and his reception was a cordial one.

W. A. Brackenridge, president of the Southern California Edison Company, with his wife, was a brief visitor at last week's convention. Mrs. Brackenridge took a prominent and graceful part in the opening patriotic exercises when she led the singing of "America." Later, Mr. and Mrs. Brackenridge were called home, to the great regret of those present at the convention.

Mrs. H. F. Jackson, wife of Captain Jackson, president of the Sierra and San Francisco Power Company and president of the N. E. L. A. Pacific Coast Section, presided at the Women's War Service Session of the recent convention. Mrs. Jackson herself most forcefully introduced the subject of women's part in the present crisis, and the excellent program which followed was a tribute to her direction. This women's session was a distinct innovation in convention programs but was felt to have brought forward much that was worth while and to have developed into one of the most important of the convention meetings.

D. C. Jackson and **Wm. B. Jackson,** consulting engineers of Boston and Chicago for electric and allied properties, have both been commissioned as majors and are under orders to report for immediate service. Mr. D. C. Jackson is to go at once to France and Mr. Wm. B. Jackson presumably to be employed in army engineering service in this country. After the business now in hand has been completed by the other members of this firm, the office is to be closed for the duration of the war. Although made up of Eastern men, this firm have been consistently interested in Western affairs, one evidence being in their continuous patronage of the Journal of Electricity for the last fifteen years.

Paul M. Lincoln, consulting engineer, and past president of the American Institute of Electrical Engineers; **John J. Gibson,** manager of the supply department; **Milton Henock,** range specialist; **M. C. Morrow,** manager of the appliance division; and **J. J. Jackson,** attorney, all of the Westinghouse Electric & Manufacturing Company, from East Pittsburg, were among the Westinghouse delegates who attended the Pacific Coast Section of the N. E. L. A. convention at Del Monte last week.

OBITUARY

Harry Herbert Trowbridge, general counsel for the Southern California Edison Company and head of its legal department since 1903, died suddenly at his residence in Pasadena on March 21. Before going to Los Angeles Mr. Trowbridge was connected with the legal department of the New York Central & Hudson River Railroad. The successful career upon which he had entered in New York City had to be abandoned on account of ill health, but even greater distinction awaited him upon the Pacific Coast, where as the legal representative of the Southern California Edison Company, he soon became widely known as an authority upon corporation and public utility law.

Errata: On page 498 of this issue, the name of the author should be C. A. Andrus, instead of C. A. Andrews as given.

Just as you would sacrifice for your child in pain—
May 20-27—Red Cross Week

MEETING NOTICES FOR ELECTRICAL MEN

(Co-operation has been the keynote of the past fortnightly period. An important meeting of the San Francisco Development League which was addressed by W. L. Goodwin, and a gathering of the Contractors and Dealers in Southern California to secure members both emphasized this idea. Conventions are planned for several of the national organizations in the early summer. The Del Monte convention of last week is reported elsewhere in these columns.—The Editor.)

San Francisco Electrical Development League

The one great meeting of the San Francisco Electrical Development League during recent months was that of May 1, 1918, which was held in honor of W. L. Goodwin, who has during recent months accomplished such effective work throughout the nation along lines of harmonizing the various fields of activity of manufacturer, jobber, contractor-dealer, and central station. The meeting was splendidly attended. Introduced by D. E. Harris, vice-president of the Pacific States Electric Company, Mr. Goodwin, in his characteristically forceful manner told of his work and explained how the symbolic representation of the well-known Wheatstone Bridge, depicted pictorially the ideal relations of the various branches of the industry.

Annual Meeting A. I. E. E.

Annual convention of the A. I. E. E. will be held in Atlantic City, June 26th to 28th inclusive. Headquarters will be at the Marlborough-Blenheim Hotel, but there are available in the near neighborhood many other good hotels which charge more or less for accommodations.

Present plans provide for a convention with four or five technical sessions, presenting from 12 to 16 papers; three delegates' meetings; a reception and dance, and ample opportunities for golf and other outdoor recreations. The entertainment features will not be elaborate but rather informal, the intention being to provide congenial association and recreation for those who attend.

The Synchronous Club

The Synchronous Club held their regular meeting at Walker Theatre Building, Los Angeles, on Thursday, May 2d, at 8:00 p. m., at which the subject, "Prime Mover Economics," was discussed by J. M. Lee, who is with the Bureau of Light and Power, City of Los Angeles. There is to be no mid-month meeting this month. Next meeting June 6, 1918.

Committee Appointments for Northwest Electric Light and Power Association

President Talbot of the Northwest Electric Light and Power Association has named the following to constitute the Public Policy Committee for Oregon:

Chairman, J. L. White, district manager, Oregon Power Company, Albany, Oregon.

George G. Bowen, sales manager, Northwestern Electric Company, Portland, Oregon.

A. B. Bower, manager, Condon Electric Company, Condon.

E. A. Boyd, manager, Vale Electric Company, Vale.

R. M. Boykin, engineer, North Coast Power Company, Portland.

C. J. Edwards, president, Coast Power Company, Tillamook.

T. H. Foley, manager, Bend Water, Light & Power Company, Bend.

H. V. Gates, president, Heppner Light & Water Company, Portland.

F. A. Harmon, manager, Eastern Oregon Light & Power Company, Baker.

Geo. L. Myers, Pacific Power & Light Company, Portland.

E. G. Robinson, president, Molalla Electric Co., Canby.

C. M. Shinn, vice-president and manager, Cottage Grove Electric Company, Cottage Grove.

J. T. Thompson, manager, Sheridan Light & Power Company, Sheridan.

R. M. Townsend, Portland Railway, Light & Power Co., Portland.

H. L. Walther, general superintendent, California-Oregon Power Company, Medford.

This committee is concerned with all matters having to do with relations between the public utilities and the public. The committee is composed of a representative from each of the Class A members (member companies) of the Association. It held its first meeting in the offices of Pacific Power & Light Company, April 3d.

At the convention of the Association in Sepetmber it was decided to create a committee composed of representatives of jobbers, manufacturers, etc., electrical contractors, dealers, and the central station industry, to further co-operation. The convention authorized the president to name one representative from the association to be a member of this committee, and F. H. Murphy, illuminating engineer of Portland Railway, Light & Power Company, Portland, Oregon, has been named.

Contractors and Dealers Association

In order to secure as many new members as possible, the contractors and dealers held an open meeting in Garfield Hall, Los Angeles, Friday evening, April 12th, and all contractors and dealers in Southern California were invited. G. E. Arbogast, president of the Southern California Electrical Contractors and Dealers, presided, and talks on contractors' problems and on the work of the association were made by J. C. Rendler, manager, Southern California Electric Company, Los Angeles; H. B. Woodill, Woodill-Hulse Electric Company, Los Angeles; Paul D. Howse, Electrical Products Corporation, Los Angeles; B. R. Hensel, electrical contractor, Los Angeles; and A. L. Spring, representative California Electrical Co-operative Campaign. At this meeting 11 new members to the association were secured and during the past three weeks the membership in Southern California has increased over 40 per cent.

BUILDERS OF THE WEST—XXIX

JOHN B. MILLER

The food control, the aviation, the naval consulting board and the Red Cross have been vastly assisted in the present national crisis by calling upon the master minds who have had an eminent part in developing the great natural resources of the West. To John B. Miller, chairman of the Board of Directors of the Southern California Edison Company, a company of world-beating attainment in engineering and in efficiency—this issue of the Journal of Electricity is dedicated, not only for his eminent service to his company, but also for the wonderfully helpful work he is doing in charge of all Red Cross work west of the Mississippi River.

ANNIVERSARY BANQUET OF THE SACRAMENTO ENGINEERS' CLUB

A recent gathering of the prominent engineers of Sacramento which celebrated the first anniversary of the founding of the Engineers' Club of that city.

Contractors and Dealers in Attendance at Open Meeting Held in Garfield Hall, Los Angeles, Friday Evening, April 12, 1918.

G. E. Arbogast, vice-president and general manager, F. E. Newbery Electric Company, Los Angeles.
R. E. Amann, manager Amann Electric Works, Los Angeles.
H. C. Barnes, Los Angeles.
Chas. Bean, Lordsburg.
J. P. Boring, Orange.
C. H. Bush, Los Angeles.
Wm. J. Burk, Los Angeles.
George Bullock, Los Angeles.
W. C. Cook, manager Gardena Electric Company, Gardena.
H. J. Cook, partner, Gardena Electric Company, Gardena.
R. E. Carter, purchasing agent, Beacon Light Company, Los Angeles.
C. H. Clausen, manager Dana Electric Company, Los Angeles.
G. B. Capps, partner, Sierra Electric Company, Los Angeles.
O. J. Crow, Los Angeles.
W. O. Driskell, Los Angeles.
R. H. Evans, Los Angeles.
Paul Ehms, partner, Golden State Electric Co., Los Angeles.
G. Gans, partner, Gans Bros., Los Angeles.
L. Gans, partner, Gans Bros., Los Angeles.
C. F. Green, manager Green's Electric Store, San Pedro.
G. D. Gillingham, Los Angeles.
A. W. Gonnerman, Los Angeles.
A. P. Gaylord, Pasadena.
A. Hilleary, Los Angeles.
L. C. Hooker, Los Angeles.
P. D. Howse, president Electrical Products Corporation, Los Angeles.
B. R. Hensel, Los Angeles.
S. F. Jones, partner, Winder & Jones, Covina.
W. L. Le Sage, estimator, Beacon Light Co., Los Angeles.
H. Lees, partner, West End Electric Co., Los Angeles.
L. H. Lang, Los Angeles.
G. Loveberg, Los Angeles.
J. H. Lowe, Los Angeles.
J. W. Lane, manager Lane Electric Co., Long Beach.
F. O. Lantz, manager Lantz Electric Co., Long Beach.
F. McGinley, manager Harbor Electric Co., Wilmington.
J. A. Newton, manager J. A. Newton Electric Co., Glendale.
J. J. Prevost, manager Pico Electric Shop, Los Angeles.
H. Rothwell, Los Angeles.
F. H. Roberts, Los Angeles.
J. C. Rendler, manager Southern California Electric Co., Los Angeles.
C. A. Renard, president Renard & Stary, Los Angeles.
H. G. Stone, Hollywood.
V. M. Stedman, manager Stedman-Manson Electric Co., Whittier.
F. D. Stevenson, Los Angeles.
A. S. Tyler, Los Angeles.
H. L. Vonder Kuhlen, Los Angeles.
J. E. Wilson, manager Wilson's Electric Shop, Los Angeles.
R. B. Winder, partner, Winder & Jones, Covina.
Chas. Walsworth, manager San Pedro Electric Co., San Pedro.
A. B. C. Dyer, Coast Electric & Machine Co., Santa Monica.
H. B. Woodill, president and general manager Woodill-Hulse Electric Co., Los Angeles.
C. Wurdeman, manager Coast Electric & Machine Co., Venice.
A. L. Spring, representative California Electrical Co-operative Campaign.

Oregon Society of Engineers

The dangers, causes and results of forest fires, and the value of prevention and carefulness were aply illustrated and explained by A. G. Jackson, of the educational department of the Forestry Service, in a stereopticon lecture given before the Oregon Society of Engineers at the Central Library, at their regular meeting on April 24th.

District No. 6, with headquarters in Portland, of which George H. Cecil is in charge, is the largest forestry division in the United States. There are 43,000,000 acres of timber lands under his supervision. This total comprises one-sixth of the whole amount of standing timber in the United States.

Mr. Jackson also emphasized the fact that the national forests were for the use of the people, both for recreation and business purposes. Summer residences may be built in attractive places therein at a very low cost.

Previous to Mr. Jackson's talk the society adopted a resolution to the effect that their salaries should be substantially increased.

"Win the War for Permanent Peace" Convention

A convention of the League to Enforce Peace, of which Wm. H. Taft is president, is to be held in Philadelphia on May 16th and 17th. Stephen S. Wise, Anna Howard Shaw, Charles B. Elliot, Charles Evans Hughes, and Henry Van Dyke are to be among the speakers.

The objects of the convention, as stated, are: To sustain the determination of our people to fight until Prussian militarism has been defeated; to confirm opposition to a premature peace; to focus attention on the only advantage the American people hope to gain from the war—a permanent peace guaranteed by a league of nations.

War Convention, N. E. L. A.

The thirty-fourth annual meeting of the National Electric Light Association and its forty-first convention, to be held at the Hotel Traymore, Atlantic City, June 13th and 14th, 1918, will be devoted entirely to problems of the war.

This will be a strictly business meeting, without entertainment of any kind. It will concern itself entirely with the vital problems of the industry arising out of the war, toward the winning of which the thoughts and energies of every public utility must be consecrated.

No papers will be read. Reports from committees and individuals, and discussions will be confined to matters of major importance, and the brief two days will allow no time for the usual helpful discussions on general topics relating to the progress of the art. Everything said and done must be keyed to a victorious conclusion, and an early one, of the great struggle on which our nation has entered and in which our industry is taking a part of continually growing importance.

Foreign Trade Club

At the May 8th meeting of the Foreign Trade Club of San Francisco, H. C. de Groot, a recent arrival from Makasser, Holland East Indies, spoke on the subject, "American Trade with Celebes Isles." J. W. Gjerlov, a recent arrival from the West Coast of South America, spoke on "American Trade with the West Coast of South America. Melville S. Toplitz, of McDonald & Co., a recent arrival from the Orient, gave an interesting talk on "Business Conditions in Japan, Korea, Manchuria, China."

The only regret we can have is that we are unable to help more—

May 20-27—Red Cross Week

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers
President—E. W. Rice, Jr., Engineering Society Bldg., New York City.
Secretary—F. L. Hutchinson, Engineering Society Bldg., New York City.
Meetings—Monthly.

Los Angeles Section
Chairman — Don. D. Morgan, 621 Pacific Electric Bldg.
Secretary—A. W. Nye, University of Southern California, Los Angeles, Cal.
Meetings—Second Tuesday of each month.

Portland Section
Chairman—S. D. Soaring, care Portland Railway, Light & Power Co., Electric Bldg., Portland, Ore.
Secretary—R. M. Boykin, care North Coast Power Co., 441 Pittock Block, Portland, Ore.
Meetings—Monthly.
May 7th—E. R. Shepard—"The Bureau of Standards and Electrolysis Mitigation."

Denver Section
Chairman — Norman Read, 828 Symes Bldg., Denver, Colo.
Secretary — Robt. B. Bonney, 603 Wyoming Bldg., Denver, Colo.
Meetings—Third Saturday of each month, from October to May, at the Denver Athletic Club. Dinner at 6:15 p. m., followed by regular meeting.
April 20th — Joint meeting with Denver Section, A. I. E. E.

San Francisco Section—
Chairman—Lars R. Jorgensen, Chronicle Bldg., San Francisco.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings — Fourth Friday each month—Engineers' Club, 7 p. m.

Seattle Section
Chairman — John Harisberger, 4015—4th Ave., N. E., Seattle, Wash.
Secretary — Glen Dunbar, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.
April 16th—S. C. Lindsay—"Recent Additions to the Generating Equipment of the Puget Sound Traction, Light & Power Co."

Spokane Section
Chairman—Charles A. Lund, W. 828 Providence, Spokane, Wash.
Secretary—J. E. E. Royer, W. 408 Cleveland, Spokane, Wash.
Meetings—Third Friday of each month.
April 19th—J. W. Hungate, C. F. Uhden, P. S. Daniels—"Hydraulic Turbines."

Utah Section
Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock, Assembly Room of Commercial Club, Salt Lake.
April 19th—E. R. Shepard—"The Bureau of Standards and Its Work."

Vancouver Section
Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch
Chairman — A. J. Swank, University of California, Berkeley, Cal.
Secretary—G. F. Teale, University of California, Berkeley, Cal.

University of Colorado Branch
President—Robt. Newman, 1071—11th St., Boulder, Colo.
Secretary—William N. Gittings, 2429—12th St., Boulder, Colo.
Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.
April 20th—Joint meeting with University of Colorado Branch, A. I. E. E.

Idaho University Branch
Chairman—V. Pearson, Moscow, Idaho.
Secretary — L. J. Corbett, University of Idaho, Moscow, Idaho.
Meetings—First Wednesday evening of each month from October to June.

Oregon Agricultural College Branch
Chairman—J. A. Hooper, Oregon Agr. College, Corvallis, Ore.
Secretary—L. Happold, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch
Chairman—H. W. Lewis, Stanford University, Cal.
Secretary—A. L. Morgan, Stanford University, Cal.

Montana State College Branch
Chairman—Roy C. Flagen, Montana State College, Bozeman, Mont.
Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.
Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Colorado State Agricultural College
Chairman—R. C. Richards.
Secretary—W. A. Stallings, Colorado State Agricultural College, Fort Collins, Colo.

Throop College of Technology Branch
Chairman—J. Paul Youtz, Throop Dormitory, Pasadena, Cal.
Secretary—Clark E. Baker, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch.
Chairman — S. E. Stites, 301 Montgomery St., Pullman, Wash.
Secretary—E. W. Tollefson, Box 393, College Sta., Pullman, Wash.
Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS

National Association of Electrical Contractors and Dealers
Chairman—W. Creighton Peet.
Secretary — Harry C. Brown, 41 Martin Bldg., Utica, N. Y.
Executive Committeeman-at-Large — W. D. Kohlwey, California; Executive Committeeman—S. C. Jaggar, Portland.

British Columbia Ass'n Electrical Contractors and Dealers
President—C. H. E. Williams, 509 Richards St., Vancouver, B. C.
Secretary—R. B. W. Pirie, 406 Yorkshire Bldg., Vancouver, B. C.
Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers
President—H. C. Reid, 507 Montgomery St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Monthly.
Convention—Del Monte, May 8-11.

Electrical Contractors and Dealers Ass'n of San Francisco
President—J. M. Carlson, 175 Jessie St., San Francisco.
Secretary—J. W. Asher, 601 Howard St., San Francisco.
Meetings—Saturday, 12:15; The States. Cafe.

Southern California Electrical Contractors and Dealers
President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.
Meetings—Every Friday at 6:30 p. m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers
President—W. Cox, Santa Cruz.
Secretary—J. A. Noggie, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers
President—F. V. McAvoy, 138 N. Center St., Reno.
Secretary—R. W. Shearer, 215 Sierra St., Reno.
Meetings—Twice a month, 15th and 30th.

Oregon Ass'n of Electrical Contractors and Dealers
President — A. S. Halls, 262 Stark St., Portland.
Secretary—J. Willis Oberender, 301-2 Dekum Bldg., Portland, Ore.
Meetings—Every Saturday, 1:30 p. m.—Secretary's office.

Portland Local Ass'n of Electrical Contractors and Dealers
President—J. H. Sroufe, Jaggar-Sroufe Co., Portland.
Treasurer — J. W. Oberender, 301 Dekum Bldg., Portland.
Meetings—Saturday, 3 p.m., at 301 Dekum Bldg.

Utah Society of Electrical Contractors and Dealers
President—J. V. Buckle, Buckle Electrical Co., 70 E. 1st St., Salt Lake City.
Secretary—E. H. Eardley, Eardley Bros. Co., 37 E. 1st St., Salt Lake City.
Meetings — Every Friday noon at Commercial Club.

Washington Ass'n of Electrical Contractors and Dealers
President — V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.
Secretary — H. D. Alleson, 404 Oriental Bldg., Seattle, Wash.
Meetings — Quarterly—second Thursdays of March, June, September and December.

JOBBERS' ASSOCIATIONS

Electrical Supply Jobbers Association
General Secretary — Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers
President—W. S. Berry, Western Electric Company, San Francisco.
Secretary — Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Quarterly. Next Meeting: Del Monte, May 6-11.

Electrical Credit Ass'n of the Pacific Coast
President—C. L. Gilson, Gilson Electrical Supply Co., 304—12th St., Oakland, Cal.
Secretary — Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Annually: San Francisco; May.

OF ELECTRICAL INTEREST

Nevada Section, N. E. L. A.
Chairman—Geo. A. Campbell, Reno, Nev.
Next Meeting—April 13th.

National Electric Light Association
President—J. W. Lieb, N. Y. Edison Co., New York City.
Executive Secretary—T. C. Martin, 33 W. 39th St., New York City.
Meetings—June.

Pacific Coast Section, N. E. L. A.
President—H. F. Jackson, Holbrook Bldg., San Francisco.
Secretary—A. H. Halloran, Crossley Bldg., San Francisco.
Meetings—Annually, in April.
Next Meeting—Del Monte, May 9-11, 1918.

Portland Section, N. E. L. A.
Chairman—C. L. Wernicke, care Westinghouse Elec. & Mfg. Co., Portland, Ore.
Secretary — R. J. Davidson, care Pacific Power & Light Co., Portland, Ore.

Illuminating Engineering Society
Meetings—First Tuesday each month.
President—G. H. Stickney.
Secretary—Clarence L. Law.
Western representative—Romaine Myers, Bacon Bldg., Oakland.

New Mexico Electrical Association
President—M. R. Buchanan, Silver City, N. M.
Secretary—E. M. Haggerson, Silver City, N. M.
Meetings—Annually, in February.

Southwestern Electric and Gas Association
President—H. C. Morris.
Secretary — H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n
President—Guy W. Talbot, 1212 Spalding Bldg., Portland, Ore.
Secretary—Geo. L. Myers, 1212 Spalding Bldg., Portland, Ore.
Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.
Next convention will convene in Portland, September 11, 1918.

Los Angeles Jovian Electrical League
President—H. N. Sessions, San Fernando Bldg., Los Angeles.
Secretary—W. C. McWhinney, Southern California Edison Co.
Meetings — Every Wednesday, 12 m.
All meetings called off until May 15th, to help sale of Liberty Bonds.

San Francisco Electrical Development League
President—R. E. Fisher
Secretary — J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Every Wednesday, 12:10 p. m.; luncheon, Palace Hotel.

Electric Metermen's Association
President — J. E. Bridges, Westinghouse Electric & Manufacturing Company.
Secretary — A. E. Coney, Great Western Power Company, San Francisco.
Meetings—About every 50 days.

Alameda County Electrical Club
President—George Drew, Pacific States Electric Company, Oakland, Cal.
Secretary — George B. Furmiss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club
Secretary—C. A. Blair, Los Angeles.
April 18th — Annual Synchronizing and Banquet.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section
President—L. S. Hamm, Pacific Tel. & Tel. Co., San Francisco.
Secretary—Chas. H. Dobson, 835 Howard St., San Francisco.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

National Officers
President—Charles T. Main, Engineering Society Bldg., New York City.
Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.
President—B. F. Raber, University of California, Berkeley.
Secretary—Chas. H. Delany, 445 Sutter St., San Francisco.
Meetings—Quarterly.
Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Los Angeles Section, A. S. M. E.
President—F. G. Pease, Mt. Wilson Solar Observatory, Pasadena, Cal.
Secretary—T. J. Royer, 200 Title Insurance Bldg., Los Angeles, Cal.
Meetings—Quarterly.

ENGINEERS' CLUBS

Oregon Society of Engineers
President — Orrin E. Stanley, Box 973, Portland, Ore.
Secretary—C. J. Hogue, Box 973, Portland, Ore.
Meetings—Annual: Feb. 4, 1918. Monthly: Third Thursday of each month.

The Engineers' Club of Seattle
President—J. F. Pinson, Seattle, Wash.
Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.
Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco.
President — B. P. Legare, 58 Sutter St., San Francisco.
Secretary—J. R. Brownell, 525 Market St., San Francisco.
Annual meeting: October.

Idaho Society of Engineers
President — W. H. Gibson, Mountain Home, Idaho.
Secretary—Ira F. Shaffner, Boise.
Annual meeting: January.

Engineers' Club of Oakland
President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento
President — George S. Nickerson, 914 Forum Bldg., Sacramento.
Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento.
April 9th—First anniversary dinner and celebration.

MISCELLANEOUS

American Ass'n for the Advancement of Science—Pacific Division
President—D. T. MacDougal, Director Desert Laboratory, Carnegie Institution, Tucson, Arizona.
Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.
Meetings—Annual.

American Chemical Society—Oregon Section
Secretary—Norman C. Thorne.

Foreign Trade Club
President — W. H. Hammer, Monadnock Bldg.
Secretary — Wm. E. Hague, Monadnock Bldg.
Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.
April 17th — "What I Have Learned at Foreign Trade Meetings"—by the members.

Pacific Coast Gas Association
President — John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.
Secretary—Henry Bostwick, 445 Sutter St., San Francisco.
Meetings—Annual. Next convention—September, 1918, in Los Angeles.

Society for Promotion of Engineering Education
Secretary—F. L. Bishop, University of Pittsburg, Pittsburg, Pa.

HAPPENINGS IN THE INDUSTRY

New Business

The M. J. Walsh Electric Co., of Portland, Ore., are now engaged in installing the electrical construction for the McEachern Ship Yards at Astoria, Oregon.

The port of Astoria, Ore., recently awarded a contract to the Ewart Electric Company for the installation of the electric wiring and material for the new bulk grain storage bins and work house now nearing completion on the port property. Its bid was in the sum of $9588. Other bids received for the work were as follows: Astoria Electric Co., $10,598.74; National Electric Co., of Portland, $10,560; Knight & Co., $10,077; S. C. Jaggar Electric Co., $13,840.

During the year just ended the Western States Gas & Electric Company, Stockton, Cal., division, reports a total of 928 kilowatts of new business added to its lines as a result of the electric heating and cooking campaign. This includes 94 ranges, 82 water heaters and 83 air heaters. The gas output of the company continues to show increases of approximately 40 per cent over a year ago, largely due to the consumption of the Holt Manufacturing Company, which is ranging from 8,000,000 to 10,000,000 cubic feet per month.

The International Vegetable Oil Company of Richmond, Cal., contemplates construction of a new factory in Richmond and will use 300 horsepower in electric motors for the operation of the plant.

The Acme Electric Company, 95 Virginia street, Seattle, has been awarded contract to wire the garage building being erected at Fourth avenue and Lenora street, which the Great Northern Construction Company is building. The company has completed installation of nine motors and several arc lights at 915 First avenue for the Bernhard Engraving Company, now consolidated with the Art Engraving Company at the same address.

The Arrow Electric Company, Seattle, has secured the contract for overhauling the electrical equipment in the four-story Howard D. Thomas building at 2000 Fifth avenue, which is to be occupied by the Saxony Knitting Company.

The NePage-McKenny Company report securing the contract for installing the electric construction in the new municipal grain elevator from the Grant Smith Co.

Changes and Beginnings

The business of the National Electric Utilities Company, New York City, has been purchased by Landers, Frary & Clark of New Britain, Conn., who will increase and develop the business.

J. C. English Company are fitting up a new and up-to-date fixture and electrical appliance store on Fifth street, Portland, between Morrison and Alder streets.

J. O. Story of Tacoma has bought an interest in the big Thorsen-Hendricksen mill at Toledo, Ore., and the name of the company has been changed to Yaquina Bay Railroad & Lumber Company, with Mr. Story as vice-president and general manager.

The electric power plant at Toledo, Ore., formerly owned by the Thorsen-Hendricksen company, will change its name also, and hereafter will be known as the Lincoln County Light & Power Company. This plant, which supplies Toledo and Newport with light and power, will at once be enlarged by the addition of a 2000 horsepower turbine and dynamo. This additional power will be used to operate a big band saw mill

which the company is building here, and to furnish power for a shipyard.

The Sprague Electric Works of the General Electric Co. announces the removal of its Boston office from Devonshire street to 84 State street, Boston, Mass. The St. Louis office has been removed from the Chemical Building to the Pierce Building, St. Louis, Mo.

The Electric Store, owned by the Comet Electric Company of Eugene, Ore., and the electric store of Cottage Grove have been consolidated. The two stores will be maintained, with the headquarters in Eugene. P. L. Womeldurf, heretofore sole owner of the Comet Electric Company, will have charge of the two stores and the city business in Eugene and Cottage Grove, while A. S. Myers, of the Cottage Grove store, will have charge of the farm lighting and telephone end of the business.

The Comet Electric Company has the contract for the wiring in connection with the addition to and alterations in the court house, and has already commenced work on the job.

Reorganization of Northern Electric Company

Another step toward the consummation of the reorganization of the Northern Electric Railway Company was taken recently when the reorganization committee filed with the Railroad Commission an application for approval of an amended plan which, it is stated, has been approved by a majority of the company's creditors. The application states that more than 94 per cent of the bondholders of most of the companies involved and approximately 97 per cent of unsecured creditors have approved the plan, while 89.50 per cent of Chico Electric Railways and 81.60 per cent of Northern Electric Railway bondholders have also given their consent to the new arrangement.

The application goes on to say that a new corporation will be created to take over all of the properties of the Northern Electric Company, the Northern Electric Railway Company (Marysville and Colusa branch), and the Sacramento and Woodland Railroad Company. This will be done by foreclosure of the various bond mortgages and by the committee purchasing the properties at the foreclosure sale and turning the same over to a new corporation.

The new corporation will not assume any of the indebtedness of the present companies. The proposed new corporation shall have a capital stock of 52,000 shares of the par value of $100 each, or $5,200,000, divided into 19,022 shares of first preferred ($1,902,200), 9578 second preferred ($957,800), and 23,400 common ($2,840,000).

San Luis Obispo Celebrates Complete Installation of New Street Lighting System

What was generally conceded to have been the biggest and best meeting to date held by the San Luis Obispo Chamber of Commerce took place at San Luis Obispo, April 4, 1918, when the organization celebrated the complete installation of a new street lighting system, brought about through the activities of a Chamber of Commerce committee. The meeting took the form of a dinner, to which the people of the county were invited as the guests of the Chamber. People were present from the principal towns of San Luis Obispo county, and the feeling of harmony between the county seat and the county at large was most noticeable.

Radio Operators Scarce

The great demand by the Navy and the Army has drained the commercial field of trained radio operators. Soon shipping companies may find themselves unable to comply with Government rules and regulations. As a consequence of the scarcity of operators the enormous demand for trained men has led to many offers of large salaries. The vessels being built by the Emergency Fleet Corporation for the U. S. Shipping Board, the Dutch vessels taken over by the Government, and the interned German vessels will all be equipped with wireless. A man experienced in radio telegraphy will almost be able to dictate his own terms of compensation.

U. S. Radio Inspector B. H. Linden and the University of California Extension Division have co-operated in forming an evening class in radio telegraphy. The class will train men who desire to enter the commercial field as radio operators or to aid their country in its crisis. For full particulars communicate with the University of California Extension Division, 301 California Hall, University of California, Berkeley, or with the branch office, 330 Lick Building, 62 Post street, San Francisco. Telephone numbers: Berkeley 7100 and Kearny 100, respectively.

City Regulation of Public Utilities

A constitutional amendment recently proposed to be submitted to the people of Oregon by the initiative is the outgrowth of the six-cent fare case in Portland, and provides for placing in the hands of incorporated cities for a period of 25 years all governmental powers relative to the regulation of public utilities.

Sabotage Act and the Public Utility

The act of congress entitled "An act to punish the willful injury or destruction of war material, or of war premises or utilities used in connection with war material, and for other purposes" (popularly known as the sabotage bill), approved April 20, 1918, is the most important and sweeping of all war statutes relating to hostile or anti-war activities.

This practically means any part of the transportation system or transportation facilities of the United States. It also includes public utilities, which supply war industry plants, such as the water, light, telephone and telegraph service to war industry plants or to forts, camps and other military and naval stations.

First Trial of Great Turbine

Electrification of the Coast section of the Chicago, Milwaukee & St. Paul Railway took a long step forward recently when its big turbine generator, the largest in the world, was turned over for the first time. The contract for current was let to the Puget Sound Traction, Light & Power Company, and the generator was installed in the White River or Lake Tapps plant, near Deringer. Installation of this turbine generator furnishes power for the operation of the electrified line of the Milwaukee from Othello to Tacoma.

The railway has yet to install substations and string trolley lines over the division. The trolley poles are now being placed in position, though operation electrically will be delayed for some time yet because of a shortage in much of the equipment required and the inability of manufacturers to keep pace with the orders with which they have been flooded since war was declared.

Increases in Utility Rates

That public service commissions everywhere are beginning to realize that public utilities must have larger rates of return if they are to remain in business, is brought out clearly in a pamphlet just issued by the National City Company. The pamphlet contains a list of the increases granted during 1917 by local and state commissions in the United States and Canada.

Attention is called to the fact that out of 462 applications for increased utility rates reported in 1917, increases were granted in 401 cases, or more than 86 per cent of the total. This means, the company says, that local and state commissions have become convinced that utilities in general are entitled to larger rates of return in order to afford adequate public service.

To Prevent Fuel Shortage

United States Fuel Administrator Harry A. Garfield has issued the following statement:

Every householder, every public utility, and every industrial user of coal engaged in work essential to the prosecution of the war are earnestly advised and urged to place with-

out delay their orders for coal to cover their needs for the 12 months beginning April 1st.

Suit to Enjoin State Railroad Board

The legal status of corporations purchasing power from other companies and distributing it to the consumer will be established by a suit filed in the Federal District Court by the Napa Valley Electric Company against the State Railroad Commission.

The action seeks to perpetually enjoin the Commission from interfering with the contract rates for electricity as established between the Napa Valley Electric Company and the Calistoga Electric Company. The Railroad Commission has rendered an opinion holding that it has jurisdiction to fix rates lower than those set forth in the contract between the two companies.

The main contention of the action through which the Napa company seeks to bar the Railroad Commission from altering the present contract rates is that the Calistoga Electric Company is not a consumer within the meaning of the Public Utilities act, buying the electricity from the Napa company and reselling it to residents of Calistoga and vicinity in Napa county.

Street Car Men to Get More Pay

An increase of three cents an hour is to be added to the wages of employees by the Puget Sound International Railway & Power Company of Everett, Wash. This means a raise of 25 cents a day. The Everett street car systems, the Everett-Snohomish and the Everett-Seattle interurban are to be operated under a contract between the men and the company for a period of one year.

Stenographers and Typewriters Wanted

The United States government is in urgent need of thousands of typewriter operators and stenographers and typewriters, both men and women. All who pass examinations for the departments and offices at Washington are assured of certification for appointment. It is the manifest duty of citizens with this special knowledge to use it at this time where it will be of most value to the government. Women especially are urged to undertake this office work. Those who have not the required training are encouraged to undergo instruction at once. Examinations for the departmental service, for both men and women, are held every Tuesday, in 450 of the principal cities of the United States, and applications may be filed with the Commission at Washington, D. C., at any time.

The entrance salary ranges from $1000 to $1200 per year. Advancement of capable employees to higher salaries is reasonably rapid. Applicants must have reached their eighteenth birthday on the date of the examination.

Public Hearing on Safety Rules for Gold Dredges

The Industrial Accident Commission of California called a public hearing for Tuesday, May 7, 1918, at 10 o'clock a. m., in room 323, 525 Market street, San Francisco. The object of this hearing was to consider amended tentative safety rules for gold dredges, which have been prepared by the following committee:

Harold Mestre (chairman), consulting engineer; F. L. Lowell (secretary), deputy mine inspector, Industrial Accident Commission; L. D. Hopfield, department manager Natomas Company of California; C. W. Gardner, representing Hammon Engineering Company; A. L. Wilde, district representative International Brotherhood of Steam Shovel and Dredge Men; Carl Brown, manager California Casualty Indemnity Exchange; R. L. Eltringham, electrical engineer, Industrial Accident Commission; H. M. Wolfiin, mining engineer U. S. Bureau of Mines, chief mine inspector Industrial Accident Commission.

In preparing these tentative rules the committee proposed a number of safety requirements which are applicable to gold dredges only. They have revised certain sections of the general safety orders and the electrical utilization safety orders, so that the same will be more applicable to gold dredges.

LANE'S MESSAGE TO INDUSTRY

In an address to the men who control American industry, delivered before the Americanization Conference in Washington, Franklin K. Lane stated the serious condition that our country faces, due to our unassimilated foreign population. He said in part:

"Now there are several things which we have come upon recently which seem to those of us who have not been wise to be discoveries. The first is that we have a great body of our own people, five and a half millions, who cannot read or write the language of this country. The second is that we are drafting into our army men who cannot understand the orders that are given them to read. The third is that our man power is deficient because our education is deficient. The fourth is that we ourselves have failed to see America through the eyes of those who have come to us. We have failed to realize why it was that they came here and what they sought. We have failed to understand their definition of liberty."

Fortunately the remedy is in the hands of the patriotic leaders of industry. It is up to them to develop a spirit of loyalty to America among their foreign-born employees, and the employers can do it very effectively.

Instruction in the duties of citizenship should go hand in hand with the teaching of English. The advantages of becoming naturalized should be brought home to the alien, and he should be encouraged to take out first papers and should be taught the legal forms for securing final papers.

Patriotism to the land of his adoption can be stimulated among foreign employees. Noon-day talks in the factories, patriotic posters, liberty bond and thrift stamp campaigns will develop loyalty if the employers persist in Americanization work and are not satisfied with a brief and spasmodic effort.

Patriotic literature and speeches in the native language of the immigrant will secure the attention of those who have not yet learned English.

But all the patriotic utterances will be wasted effort unless at the same time the spirit of fair play is observed in our dealings with the alien employee. Instead of discriminating against him, he should be regarded as a guest of the nation and an asset to our man-power.

Here is one reason for Americanization: the knowledge of English reduces the danger of accidents:

"I should be afraid to estimate the aggregate amount of waste each year to this country through a non-English speaking operative's failing to understand an order, with a resultant costly blunder. I have known a single blunder to cost as much as $2000. Then there are thousands paid out for injuries, many of which may be traced directly to the inability of the employee to understand English."

(Reported by the Efficiency Engineer of the Semet-Solvay Company of Detroit.)

Other reasons for Americanization are the promotion of loyalty to the company and to the nation.

The reduction of labor turnover through such Americanizing influences as improved housing, better working conditions and fair handling of labor disputes is recognized as good business.

The resolutions adopted by the Americanization Conference follow:

1. The adoption of the policy that the Federal Government should co-operate with states and through the states with the local communities in carrying on an extensive, intensive and immediate program of Americanization through education, especially for non-English speaking foreign-born adults.

2. That the industries employing large numbers of non-English speaking foreign-born persons should co-operate with local communities, state, and Federal governments in carrying out this proposition.

3. That adequate appropriations should be provided by the Congress to be expended through appropriate government agencies for the foregoing purpose.

4. That in all schools where elementary subjects are taught they should be taught in the English language only.

LATEST IN EVERYTHING ELECTRICAL

(Many petty trouble calls in central station service departments might be eliminated if a convenient instrument for testing circuits were on hand. Such a device is here described for the use of inspectors, line men, trouble men and others. An automobile electric kitchen designed for army use, with provision for all emergencies, promises a new field of opportunity for electric ware. Other devices and appliances which have recently been put on the market are further noted.—The Editor.)

A FUSE AND CIRCUIT TESTER

A fuse and circuit tester designed for the testing of all alternating or direct current circuits from 110 to 600 volts has recently been gotten out by the Electric Service Auto Company of Portland, Ore. It is used for locating open or short circuits, grounds, blown fuses or any other trouble occurring in lighting or power lines or apparatus.

Tube tester

It was designed to do away with the more cumbersome, costly and dangerous "lamp bank" and replace it with an economical and safe device that can at all times be carried in the pocket. Its safety features are particularly emphasized. It is always set for testing 600 volts, and is safe even if the push button be accidentally pressed.

The case is made of molded insulation with no current carrying parts exposed. The complete tester weighs 8 ounces and the overall dimensions are 3 inches long, 2 inches wide, 1 inch deep. It is provided with 6 inch flexible leads equipped with brass tips.

The tester is not only very handy for the electrician's or "trouble shooter's" kit, but is universally useful wherever electricity is used.

P & S MEDIUM BASE, BRASS COVERED RECEPTACLE

To satisfy the demand for a medium base, brass covered receptacle, Pass & Seymour are releasing P & S 60020. The shell or cover of this receptacle is in one piece and is made especially rigid by an additional bead which is spun on the skirt of the cover. The shell proper of this device is threaded to receive the standard types of the "Uno" shadeholder.

P & S Receptacle

The brass shell or cover is anchored to the porcelain interior by means of twin screws and these in turn are held in place by means of special washers.

The porcelain foundation for the interior is cast in one piece and on this the keyless interior is mounted—providing a freedom of accessibility and wiring room, so much desired by the practical wireman.

The supporting screw-holes for this device are spaced 1⅝ inchs and 2 inches on center. The holes for introducing the wires from the back of this receptacle are of ample size to accommodate heavy wires and the terminal screws will be found of sufficient size and strength to grip and hold the wires. The lamp-screw shell is of special copper alloy and is secured to the porcelain base by a heavy horseshoe reinforcement.

THE TRIUMPH ELECTRIC SEWING MACHINE

The compact, portable electric sewing machine has proven so popular that it will, eventually largely supersede the foot-operated type in districts where electricity is available.

A new portable machine has just been placed on the market by the Triumph Specialty Company, 235 Canal street, New York City. This machine consists of a sewing machine head, a motor, a speed regulator and a cover. The whole outfit can be packed inside the cover, and is so light that it can be easily carried, and so compact that it can be put away in a closet. The machine, which can be used on any table, is always ready for operation when connected to any lamp socket.

The sewing machine head is manufactured especially for the Triumph Company by the New Home Sewing Machine Company, and is an adaptation of one of the most popular models. It operates on the lock-stitch principle, and is provided with a full set of attachments for tucking, ruching, and other operations.

A popular sewing machine

Power is supplied by a Westinghouse Sew-Motor, which can be operated on direct current circuits of 115 volts, and on alternating current circuits of 110 volts, of any frequency up to 70 cycles. The motor drives the machine through a belt, and not by means of a friction pulley, thus assuring quiet operation and avoiding undue side thrust, which wears out the bearings. Occasional filling of the grease cups (oil is not used), is the only attention the motor requires.

The speed regulator which rests on the floor and which is operated by pressure of the foot, provides any speed from one to several hundred stitches per minute. It is so constructed that there is no sparking at the contacts, and, being made of steel and heavily insulated, it is practically indestructible. A ten-foot, well-insulated and reinforced flexible cable, with an attachment plug, is provided for connecting the motor with the lamp socket.

The machine is handsomely finished in polished nickel and black enamel and is mounted on a Circassian walnut base with rubber feet to prevent marring the furniture on which it is placed. The cover is also of Circassian walnut.

AN AUTOMOBILE ELECTRIC KITCHEN

A new automobile electric kitchen has been designed and built by the Duparquet, Huot & Moneuse Company, primarily for army use. It consists of a standard Ford touring car and Smith Form-A-Truck attachment on which are mounted a small direct-current generator and a number of insulated cooking compartments. The cooking compartments are fitted with electric heating units and provided with passages for the exhaust gases from the engine, the heat which materially assists in the cooking operations.

The vehicle body is 10 feet long and 4 feet wide, and is fitted with a canvas top of the regulation army type, with sides extending to protect the operator from the weather. Eighteen-inch hinged side platforms are fitted which, when in position, provide access to all cooking compartments, and when closed lie within the clearance line of the vehicle.

The generator is of standard General Electric construction, totally enclosed, and is rated at 6½ kw., 125 volts, 1800 r. p. m., and is designed for continuous operation at rated load. The generator is driven from the transmission shaft of the automobile by silent chain. Voltage is judged by pilot lamp and regulated by the speed engine, no instruments being necessary. Protection against short circuit and overload is provided by an overload circuit breaker and fuses. A larger, and for many purposes more desirable, equipment employing a 12 kw. generator, could be mounted on a two-ton truck.

Water for cooling the engine is contained in a heavy galvanized steel tank, located in an insulated compartment at the rear of the vehicle. The water is circulated through

Automobile Electric Kitchen

the engine and radiator by means of a centrifugal pump mounted on the engine. This cooling water may be used for culinary purposes, if the pipes, radiator, etc., are occasionally flushed out and cleaned.

All methods of cooking, with the exception of broiling, have been provided for. Broiling can be done by installing an electric broiler in the top of the oven.

Underneath the oven, and heated by it, is a warming closet large enough to hold roasting pans. This closet is fitted with drop doors on both sides for serving purposes. Under the warming closet are located the switches, circuit breaker and all fuses for heating circuits.

There are four fireless cooker compartments, each having a capacity of 30 gallons. The insulation, which is two inches thick, is fireproof, self-supporting and light in weight.

Because of the efficient insulation of all cooking compartments it is necessary to operate the generator at its full capacity for only a short time. In ordinary cooking operations the fuel consumption will, of course, depend upon the extent to which the operator takes advantage of the fireless cookers. Cooking can be done as long as the engine runs. In case of complete break-down current can be supplied from the generator of a second car, if this is available, and the exhaust heat from this car used to continue the cooking operations, thus keeping both kitchens in service. The second car could also tow the disabled one, if necessary.

The electric generator could also be used to supply light or power for any purpose within its capacity. For instance, the 6½ kw. generator could supply current for 246 25-watt lamps or 650 10-watt lamps, or power for the electrical equipment of a field hospital for X-Ray work, sterilizing, etc.

While performing this service the exhaust heat could be employed for cooking and heating the water. The generator on the larger equipment, of course, could furnish correspondingly more power.

BELL RINGING TRANSFORMER

An improved bell-ringing transformer is announced by The Packard Electric Company of Warren, Ohio. The new instrument is of the same electrical construction as the former Packard Belle Transformer, but several improvements have been made in the design of the case. The former type had a brass-bolted two-piece case with lugs projecting from the top and two lower sides, and these have been eliminated by making the heavy porcelain case in one piece. This results in a neater, more compact instrument—the only projecting parts being the bell-wire binding posts and two small slotted flanges on the base to receive the screws by which the instrument is secured in place.

Bell ringing transformer closed

The electrical element is inserted in the case through an opening in the base and then completely covered with a fine grade of sealing compound, thus forming the unit into practically one solid piece. The leads are marked in raised letters on the adjacent porcelain, thus insuring against any possible mistake in making connections.

The new instrument is so made that a dead short circuit on the secondary or bell side for an indefinite length of time will pull less than 15 watts from the 110 volt service wires.

The cases are finished in blue with a high glaze which renders the unit attractive to the eye and assists materially in making sales.

NORTHWESTERN ACTIVITIES

Traction Company Wage Offer Rejected

The offer of the Puget Sound Traction, Light & Power Company to increase wages of trainmen, which increase should be binding until August 1, 1919, or until 60 days after the conclusion of peace in the European war, was rejected by Tacoma and Seattle employees. The proposed agreement provided for increase of pay for trainmen of 5 cents an hour and for $15 a month extra for other crafts paid monthly, the agreement dating from April 15, 1918. It was claimed by those opposing the offer that it would tie them to an agreement for an indefinite period, and it was claimed that the advance would be insufficient, particularly in view of the scarcity of men. The agreement under which the men are now working expires July 31, 1918.

Plans for Elevated Road Changed

Plans for the elevated street railway line which the city of Seattle proposes to build into the industrial section at a cost of $350,000, are to be changed to admit of greater clearance for railroad tracks over which the line crosses. The height of the clearance is to be 23 instead of 22 feet, and the width of the clearance 9 feet instead of 7 feet 6 inches.

BOOKS AND BULLETINS

Patent Office Fees on "Enemy" Owned Patents

The War Trade Board has authorized the payment of United States Patent Office fees requisite for the filing, prosecution, registration and preservation of patents, trademarks, prints, labels, or copyrights, of an "enemy" or "ally of enemy" by any person within the United States, where such person is the holder of a power of attorney granted by such "enemy" or "ally of enemy," provided however, that when such fees are to be paid from the funds of an "enemy" or "ally of enemy," in the United States, such payment shall be made subject to the approval of the Alien Property Custodian.

Textile Mill Lighting

"Modern Methods in Textile Mills," by Eugene Szepese, is a very attractive little book of 54 pages published by the Westinghouse Lamp Company. It is a very clever and "modern method in advertising," for the booklet emphasizes the important part that artificial light plays in up-to-date textile plants.

The Hunt Tension Adjusting Coupling, for use with stevedore rope, is being introduced by an illustrated letter sent to the trade.

Upbuilding the Industry

A pamphlet dealing with problems of rate regulation and labor, the relationship between public utilities, the communities they serve, and their employees, has been reprinted from an address, before the Detroit Board of Commerce, by Theodore P. Shonts, under the title, "The Old Order Changeth, Giving Place to New."

A collection of letters from various state utility commissions and inspection bureaus, recommending the observation of the National Electrical Safety Code to the electrical contractors, lighting companies and architects of their respective states, has been sent out by the National Bureau of Standards in connection with the announcement of the revised edition.

A press bulletin of the Chamber of Commerce of the United States contains the recommendations of the Committee on Water Power Development as to what legislation Congress might wisely pass for encouraging the development and conservation of the water power resources of the United States.

A supplemental list of inspected mechanical appliances has been recently given out by the Underwriters' Laboratories of the National Board of Fire Underwriters.

A reprint from a New York paper which is being sent out presents the arguments of O. B. Willcox for better financial support of public utilities under the heading, "To Keep Utilities from Railroads' Fate."

"Electrical Equipment in the Woodworking Industry" is the title of a new circular just issued by the Westinghouse Electric & Manufacturing Company. The publication is profusely illustrated by views of motor driven woodworking machinery both alone and as installed in representative woodworking plants. Starting with the general subject of motor drive, the reasons for its adoption, such as increased production, better light, greater safety to employees, higher efficiency of machines, more accurate knowledge of cost and greater freedom in power distribution, are explained.

Electric Appliances and Supplies

An attractive colored folder which points out ways in which you may "help your customers save fuel, food, time, labor, and keep business coming your way," by concentrating on the sale of electrical appliances, is the recent trade stimulant which has been issued by the Hotpoint Division of the Edison Electric Appliance Company.

A dealers' catalogue of electric fans for 1918 has been gotten out in attractive shape by the General Electric Company.

The Cutler-Hammer Mfg. Co., of Milwaukee, Wis., has just issued publication No. 220, four-page pamphlet illustrating and describing C-H Electric Beer Vat Driers. Further, it gives some of the advantages of drying beer vats by electricity. The C-H Beer Vat Driers are made with two and three heats, and in three sizes, ranging from 750 to 1250 watts on low heats and 3000 to 5000 watts on high heats. The pamphlet also illustrates a direct current motor starter, a porcelain push socket and a porcelain push switch especially adapted for use in breweries and other damp places.

A price list of porcelain Shurlock key and keyless sockets and receptacles has been gotten out by Pass & Seymour Company.

A new publication has been issued by the Bureau of Standards (Circular 67) entitled, "Combined Table of Sizes in the Principal Wire Gages." This table combines in one series the sizes in the American (B. & S.), Steel, Birmingham, (Stubb's), British Standard, and Metric Wire Gages, arranged in order of diameters of wires. It gives the diameters of all the gage numbers in these five systems, in mils, inches, and millimeters, also the cross-sections in square mils, circular mils, square inches, and square millimeters. The table is specially useful to manufacturers who wish to determine the nearest equivalent in American or British gage sizes of wires, specified in millimeters or square millimeters, or vice versa.

Byers' wrought iron pipe is the subject of an attractive folder gotten out by the A. M. Byers Company of Pitsburgh, Pa.

A bulletin on Drum-type Switches as well as one on Automatic Starters for direct current motors have been recently given out by the General Electric Company.

Of Scientific Interest

Bulletin No. 99 of the University of Illinois Engineering Experiment Station covers the subject of "The Collapse of Short, Thin Tubes," setting forth the results of a series of experiments carried out by A. P. Carman, professor of physics at that university.

"Apparent Dielectric Strength of Varnished Cambrie" is the title of Bulletin No. 15 of the Research Division, Electrical Engineering Department, Massachusetts Institute of Technology. The paper represents a series of investigations by A. E. Kennelly and R. J. Wiseman, reprinted from an article appearing in the Electrical World.

Powdered Coal as a Fuel

by C. F. Herington, mechanical engineer; size 6x9 in.; 211 pages; published by D. Van Nostrand Company, New York, and for sale by the Technical Book Shop, San Francisco. Price $3.00.

The present importance of the fuel situation gives particular interest to this comprehensive treatise on pulverized coal. The question of which coals are adaptable for powdering, and their preparation, is here discussed, as well as the application of this fuel in various industries. The book is well illustrated, showing the various types of apparatus in use both in preparing and consuming the coal, with the principles involved and actual installation. The final chapter is devoted to explosions, and it is particularly pointed out that powdered coal is as safe as coal in lumps, provided common sense and judgment are exercised. A bibliography of both magazine articles and books on the subject is appended.

NEW ELECTRICAL DEVELOPMENTS

(Several new power developments are proposed in the Northwest. Tacoma, which has just voted down several bond issues is soon to be faced with another to meet the car situation. In the Pacific Central and the Southwest districts, much interest is being taken in the possibility of hydro-electric developments under the new Federal finance bill. A large project is suggested for the Feather River district. Several applications for water for power development are recorded.—The Editor.)

THE PACIFIC NORTHWEST

SEATTLE, WASH.—G. Geske, at $16,186.50, was awarded the contract for labor, materials, etc., for the elevated municipal railway.

SALEM, ORE.—The Public Service Commission recently denied an application from the electric light and power company of Burns for an increase in rates.

SEATTLE, WASH.—The Auto Electric Hand Signal Co. of Seattle, has been incorporated for $25,000 by J. C. Myer, H. A. Wilson and W. F. Rotermund.

SEATTLE, WASH.—The Leone Dual Lighting & Irrigation Company has been incorporated for $50,000 by C. P. Gorman, J. G. Brown and W. H. Angel.

SPOKANE, WASH. — Negotiations will soon be under way for a new general street lighting contract. It is proposed to replace the present arc-lamp lighting system with nitrogen-filled lamps.

CHEHALIS, WASH.—The ordinance to grant O. E. Anderson and others of Portland a franchise for a second electric light and power system in the city of Chehalis was lost in a recent election by 26 votes.

ASTORIA, ORE.—The Port of Astoria has awarded a contract to Ewart Electric Company for the installation of electric wiring and material for the new bulk grain storage bins and work house, at $9588.

SEATTLE, WASH. — The Rothert Process Steel Company is contemplating an addition to its smelter (100 ft.) and the installation of a 10-ton electric furnace. The offices of the company are located at 622 Harriman street, Seattle.

RAVELSTOKE, B. C.—Plans are being made by the Lanark Mines Company for the early expenditure of $25,000 to $30,000 in building a power plant and installing equipment. The manager of the company is W. B. Dornberg of Spokane.

SEATTLE, WASH.—The Board of Public Works has decided to purchase 514 tons of 60-pound rails for the municipal elevated railway and has closed a contract with the Industrial Machinery Company, Smith Building, at $68 a ton, including angle bars.

NEW WESTMINSTER, B. C.—The Campbell River Lumber Company has recently installed a step-down transformer station to convert the high-tension current of 12,000 to 2200 volts. The amount of energy used in the mill is about 950 horsepower.

YAKIMA, WASH.—Application has been filed with the Federal land office here by the Blackrock Power & Irrigation Company for an easement for a transmission line for a distance of about 35 miles from Priest Rapids to Hanford. The line is to carry 66,000 volts, the term asked is 50 years, and the rental $5 per mile.

ASTORIA, ORE.—In order to provide suitable transportation facilities for the industrial plants in Astoria, the Port of Astoria Commission has authorized the immediate construction of the first section of a proposed belt line railroad to encircle the water front from Tongue Point around Smith's Point to Fairfield Point on Young's Bay.

ASTORIA, ORE.—The Hammond Lumber Company has signed a contract for another turbine and generator of 2000 horsepower capacity and capable of furnishing 3000 horsepower for several hours at a time. In addition to this, four 600 horsepower water tube boilers have been purchased. This will quadruple the capacity of the Pacific Power & Light Company here.

SALEM, ORE.—The application of the Crown Willamette Paper Company for a permit to appropriate 200 second feet of water from Young's River near Astoria for development of 2273 horsepower has been approved by State Engineer Lewis. It is estimated that the development will cost $150,000 and involves the construction of a dam 80 feet in height, short pipe line and power house.

TACOMA, WASH. — The city council has designated Charles D. Atkins and City Attorney U. E. Harmon to provide means for raising money to purchase more cars for the municipal street car line to the tide flats. It is presumed that they will recommend that bonds be issued in the sum of $300,000 on the new system to refund the present bonds and provide money for buying additional cars.

BELLINGHAM, WASH.—The stock and equipment of the Mills & Larson electric store at 1331 Dock street has been purchased by the Modern Electric Company, 1322 Dock street. Both stores will be operated at present, but later the retail store will be removed to the location formerly occupied by Mills & Larson and the store at 1322 Dock street will be converted into a battery station and electric repair shop. The contracting business of Mills & Larson will be continued.

WALLA WALLA, WASH.—The city commissioners have ordered a survey of Mill Creek above the water intake as far as Tiger Canyon. The purpose is to supply the city with a better quality of water during the winter and early spring, and to determine whether there is sufficient power to operate a hydro-electric plant capable of pumping water from deep wells, which would assure the city a wholesome supply of water at all seasons. If sufficient power can be generated, the commissioners will investigate the question of lighting the city streets.

SPOKANE, WASH. — The construction of the proposed Niagara system power plant here with a rated capacity of 40,000 horsepower will be necessary in two years if the business of the Washington Water Power Company continues to grow in that period as it has in the last year, according to the testimony of D. L. Huntington, president of the company, given before the joint public service commissions of Washington and Idaho at Spokane recently. The hearing is being held to establish a basis for re-valuation of the property of the company.

TOLEDO, ORE.—J. O. Story of Tacoma has bought an interest in the Thorsen-Hendricksen mill here, and the name of the company has been changed to Yaquina Bay Railroad and Lumber Company. The electric power plant here, formerly owned by the Thorsen-Hendricksen Company, will change its name to the Lincoln Light & Power Company. This plant, which supplies Toledo and Newport with light and power, will at once be enlarged by the addition of a 2000 horsepower turbine and dynamo. This additional power will be used to operate a big band saw mill.

GOLD HILL, ORE.—The United States District Court for this district has confirmed the sale of the Rogue River Public Service Corporation's properties in Jackson and Josephine counties to Newton W. Roundtree, of Portland, for a sum just sufficient to cover the court charges and subject to the bonded indebtedness. The holdings consist of a large acreage in the two counties and the power plant at Grants Pass and Gold Hill, with power lines and franchises with the two cities. The bondholders, aggregating the sum of over $500,000, forced the concern into the hands of receivers last June and the local creditors' claims, amounting to over $40,000, are a total loss.

SEATTLE, WASH.—The Skykomish Power Company has submitted modified plans for the improvement of the Stillaguamish power site. Estimates covering the proposed additional developments are as follows: A dam to be constructed at an elevation of 950 feet with an ultimate elevation of 1050 feet. With the development of the Stillaguamish alone, this site would produce 66,000 horsepower with power house at an elevation of 400 feet, or 90,000 horsepower with dam at 1050 feet; the building of two penstocks from standpipe to turbine 600 feet in length and 8 feet in diameter; the installation of two vertical units giving 30,000 horsepower in power house; power house of reinforced concrete for future extension to provide two more units of same capacity, etc. All these features, including water rights, to cost $5,500,000.

PACIFIC CENTRAL DISTRICT

SONORA, CAL.—Mining operations are to be resumed at once on the Gold Ridge mines. Electric power is to be installed.

SAN FRANCISCO, CAL.—The Beach Electric Company has issued $10,000 worth of shares to Harry Beach, Theo. De Pass and Abram P. Burr.

VALLEJO, CAL.—Sealed bids are being received by the city council for lighting streets and furnishing electric current for lighting and power purposes for the year.

RED BLUFF, CAL.—According to City Engineer Rollison, construction on the municipal lighting system for this city will be ordered shortly. The system planned will cost about $6000.

SAN FRANCISCO, CAL.—The Chicago and San Francisco Amusement Company has let a contract for an electric sign on marquee of theater building at 1077 Market street, to cost $1500.

RUTH, CAL.—Fred W. Gundlach has applied for one second foot of waters of Mad River in Trinity county for use on 20 acres. Applicant proposes to pump the water and the estimated cost of the diversion is $2500.

FRESNO, CAL.—Engineer Clarence Murray has been instructed to prepare plans and specifications for the electrolier system on South Van Ness avenue and calling for alternate bids on cast iron and concrete standards.

AUBURN, CAL.—A telephone exchange has been established in Penobscot by the Pacific Telephone & Telegraph Co. The exchange is in the residence of J. L. Zuver, a former telephone man, and he is the operator and manager.

SAN FRANCISCO, CAL.—The Delta Electric Company of Marion, Indiana, manufacturers of electric lighting devices and specialties, have opened a branch at 686 Mission street, this city, in charge of O. E. Yates, Western sales manager.

RED BLUFF, CAL.—The city trustees of Redding are now ready to go ahead with the installation of a unit of municipal lighting system, which has been estimated to cost about $6000. The city is now paying $335 per month for operation.

LITCHFIELD, CAL.—Alton B. Curtis of Litchfield has applied for one second foot of Balls Canyon Creek, tributary to Willow Creek, in Lassen county, for the irrigation of 65 acres by means of a pumping plant lifting the water to a height of 70 feet.

RICHMOND, CAL.—The city council has voted $12,000 for electrical equipment for the municipal wharf, now under construction. Contracts have been awarded for two electric trucks, at a cost of $4383, to the United Vehicle Company, and for a five-ton electric crane to the Cyclops Iron Company at $7500.

VALLEJO, CAL.—The following bid was received by the chief of the bureau of yards and docks, Navy Department, Washington, D. C., for furnishing the Mare Island Navy Yard two 500 kilowatt rotary converters with switchboard and accessories: Westinghouse Electric & Manufacturing Company, Washington, D. C.: Item 1, $24,203; 1a, $1000; 2, $19,121; 2a, $850; 3, $5277; 3a, $150.

JACKSON, CAL.—The Gage mine, situated on the Jones property near Shawmut, has given promise, in the shape of a good body of ore, that it will develop into a big gold producer. W. F. King, manager of the Sierra & San Francisco Power Company, was called to the mine to make necessary arrangements for operating by electricity.

OAKLAND, CAL.—Officials of the San Francisco-Oakland Terminal Railways are going to have a little railroad of their own. Articles of incorporation have been filed with the county clerk for the Emergency Transportation Company, a $20,000 corporation in which W. R. Alberger, George H. Harris, F. W. Frost, B. W. Fernald and W. T. Smith have one share each.

OCEANSIDE, CAL.—At a meeting of the improvement society, the telephone and lighting proposition came up for discussion. Authority was given to Mr. Pugh to go ahead with the construction of the telephone system as soon as possible. A petition for a lighting system will be presented to the board of supervisors, after which the residents will vote upon the question.

WOODLAND, CAL.—In order to furnish the Yolo county rice growers with water for this season's crop, contracts were let by President Huston of the Yolo Water & Power Co. as follows: Pump contract awarded to Byron Jackson Company, 55 New Montgomery street, San Francisco, and engines to California Hydraulic Company, 70 Fremont street, San Francisco. Installation must be made by June 15th.

OAKDALE, CAL.—The irrigation board has appointed Directors Richards and Crow to see about getting a right of way for a road to the D. S. Reed ranch in Langworth. The board also agreed to build a 300 foot pipe line from the Dry Creek lateral to the old Palmer ranch. The board ordered the superintendent to investigate the cost of a pipe line or ditch to Wesley Reid's ranch, and other land in that section, a total of 200 acres.

SAN FRANCISCO, CAL.—The proposal to build a combination street and steam railroad over the recently built Hunter's Point boulevard, to accommodate the 3000 men who will be employed at the shipbuilding plant to be constructed there, was the subject of a discussion at a conference of members of the Board of Supervisors, representatives of the Federal government and officials of the Union Iron Works. A tour of inspection of the proposed route was made.

MODESTO, CAL.—L. Wiley, expert reclamation engineer of Boise, Idaho, one of the two engineers recommended by the U. S. Reclamation Service for the work, has been employed jointly by the Modesto and Turlock irrigation districts to make the necessary investigation to determine the practicability of the Don Pedro Reservoir site on the Tuolumne River above the La Grange dam for storage purposes, and will enter upon the work soon after May 15th.

GAZELLE, CAL.—Edward C. Latchem of Gazelle has applied for 12 second feet of Grouse Creek, tributary to East Fork of Scott River in Siskiyou county, for the generation of electrical power for the operation of mining properties. The principal works consist of a dam 20 feet high, 75 feet long on top and 50 feet on the bottom, and a main ditch two and one-half miles in length. The total fall to be utilized is 400 feet, and it is proposed to generate 400 theoretical horsepower. The same applicant asks permission to use the water also for mining purposes.

OROVILLE, CAL.—Plans for another huge hydro-electric plant for the Feather River district have been announced by a group of Oroville men, and will be presented to the commission which will be appointed to administer the huge fund Congress has appropriated to finance industries considered essential to the conduct of the war. The plan calls for the conversion of the Bald Rock Canyon into a huge impounding reservoir. This can be accomplished by constructing a dam 1160 feet in length and 650 feet in height. With this dam a total fall of 1750 feet can be secured, capable of developing 166,000 horsepower. The plans of the backers of the project

for this development are to be made in three units. The first power plant will be located at the foot of the dam. A second power plant is planned for Canyon Creek, while a third power plant would be situated near Bidwell Bar. It has been estimated that the total project can be constructed for not more than $7,500,000.

SAN FRANCISCO, CAL.—Colusa Land and Water Company of San Francisco has applied for 200 cubic feet per second of the waters of the Sacramento river in Colusa county for agricultural purposes. The works consist of the following: Main canal, 8.7 miles long; a pumping plant at the point of diversion consisting of one 42-inch pump with capacity of 100 second feet, driven by 400 horsepower motor, and two 26-inch pumps with capacity of 50 second feet each, driven by 200 horsepower motors; a duplicate of the foregoing plant to be installed at the end of the main canal. It is proposed to irrigate 8822 acres and the estimated cost of the project is given as $219,890.

THE PACIFIC SOUTHWEST

LOS ANGELES, CAL.—The Pacific Electric Railway Company has been instructed by the board of public utilities to double-track its car line between Wilmington and Long Beach immediately.

NOGALES, ARIZ.—The Mountain States Telephone & Telegraph Company is beginning to prepare for the installation of its new system in Nogales. It will be two or three months before all will be complete.

SAN DIEGO, CAL.—The San Diego Electric Railroad Co. will start work at once on rebuilding one mile of track at East San Diego and pave the same distance. The balance of the present track on the East San Diego line will be repaired.

BURBANK, CAL.—The city clerk is advertising for bids for a substation which will receive energy from a three-phase, 50 cycle, 15,000 volt transmission line. The transformers are to be indoor type, 200 kva. each, core type, single-phase, oil cooled.

LA HABRA, CAL.—At a meeting of the Merchants and Manufacturers Association, a contract was signed by 20 members of this body with the Edison Company for goose-neck electric street lights at a cost of $3 for 100-watt lights and $1.75 for 60-watt lights.

LOS ANGELES, CAL.—An order was adopted by the city council for the installation of necessary ornamental lighting posts and appliances upon Broadway between California street and First street, and upon Broadway between First street and Tenth street.

LOS ANGELES, CAL.—Permission has been granted the board of public service commissioners to use certain tide lands at the Los Angeles harbor for the operation of a substation in connection with the generation or distribution of electrical energy by the bureau of power and light.

EL CENTRO, CAL.—Bids have been taken by the directors of the Imperial Irrigation District at El Centro for the construction of a check gate in the West Side main canal to be known as "Foxtail Checkgate." The structure will be located about four and one-half miles north of Dixieland.

OXNARD, CAL.—Construction work of office building, pump house and superintendent's residence at Ivy Lawn cemetery has been started, and the Edison Company is erecting poles to carry a power and electric light line to the cemetery in order to furnish the power for the pumping machine and to light building and grounds.

LOS ANGELES, CAL.—The promised fight against the Economic Gas Company's effort to secure a blanket franchise from the county failed to materialize when the franchise was put up for sale by the board of supervisors. The company's bid of $100 was accepted. The board also granted the Midway Gas Company a blanket franchise. The bid was $100.

YUMA, ARIZ.—The matter of letting a franchise for electric power, light and water for the valley in the region of Semerton and Gadsde was considered at a meeting of the board of supervisors. The Yuma Gas, Water & Light Company asked for an extension of its franchise, which as yet it has failed to exercise. Messrs. Ewing and Sanguinetti asked for an exclusive franchise.

YUMA, ARIZ.—The Coachella Ice & Electric Company, which supplies the Yuma Gas, Light & Power Company with current from the high Sierras of California, has started the work of putting in a large new transformer for local needs at the California end of the Highway bridge. The new apparatus will be complete in every detail and will enlarge the capacity of the local distributing system by 50 per cent.

WILLCOX, ARIZ. — A telephone company has been formed here with 24 charter members, and a telephone line is to be built in the near future connecting the Stronghold with both Cochise and Pearce. The main line will be about 20 miles in length, with several miles of side lines. At the meeting of the telephone company the following officers were elected for the ensuing year: President, C. H. Wilson; vice-president, A. J. Havin; secretary, R. L. Meers; treasurer, G. H. Dean.

ROSWELL, N. M.—Indications are that the waters of the Ruidoso, which have not only supplied farmers of Rio Ruidoso and Hondo valleys for a number of years, but have also been made one of the beauty spots of New Mexico, are to be diverted over the mountains to Carriozo and used by the El Paso and Southwestern Railway Company. The plan is to run a pipe line from the north fork of the Ruidoso across the mountains to Carriozo, and then north along the line of the El Paso and Southwestern. The Ruidoso Water Users' Association has made a protest, asking a suspension of this order and for a hearing before the commissioner of public lands.

LOS ANGELES, CAL.—Wilbur O. Lusk of Los Angeles has applied to the Water Commission for 250 cubic feet per second of the Pit River, Hatchet Creek and Montgomery Creek in Shasta county, for the development of electrical energy at a drop near Round Mountain. There is a proposed ditch and pipe line six and one-half miles long, and the amount proposed to be developed is 7500 kw. The same applicant also makes application for the use of the identical water for irrigation purposes after its use for power generation, by means of a ditch and pipe line 30 miles in length. The amount of land proposed to be watered is 40,000 acres. The cost of the combined project is estimated at $250,000.

THE INTER-MOUNTAIN DISTRICT

SALT LAKE, UTAH—The Diebold Electric Company has recently been incorporated in this city.

VERNAL, UTAH—The Vernal Milling & Light Company has filed an amendment to its articles of incorporation, increasing the capital stock from $100,000 to $150,000.

GOLDFIELD, NEV.—If present plans mature, Caliente will have electric lights in a short time. The Salt Lake Route has agreed to furnish electricity to Lincoln county for $200 a month.

BUTTE, MONT.—The Butte Electric Railway Company will spend about $70,000 in track and street improvements within the next few weeks, including new switches, double tracks, etc.

SALT LAKE, UTAH—The Woodruff Irrigation Company of Salt Lake City has filed an amendment to its articles, increasing the number of stock shares from 4000 to 10,000, and bringing the capital stock up to $50,000.

PRICE, UTAH—The Wellsville City Irrigation Company has been incorporated at Price for $4 140, by Daniel H. Maughan, Wm. Allen, Geo. Haslam, Robert A. Leishman, H. C. Parker, H. L. Maughan and Frank O. Gunnell.

PUEBLO, COLO.—The Arkansas Valley Railway, Light & Power Company has recently completed an extension of its transmission lines to the Outland Ranch, and has accepted a contract to extend its lines to other ranches in that vicinity.

Ad-itorial Comment

(Advertising is the salesman's best ally. It smooths his way and conserves his time. It is the advance agent that is continually building prestige for the house he represents and the goods he sells. It is worse than foolish to imagine that a territory is covered, especially this great territory west of the Rockies, because a salesman goes over it once a year or even every three months. The salesman may get the business that is to be had when he is on the ground, but how about the intervening time or the little places he misses? The advertisement goes before to introduce him, is there to back him up when he is there, and is on the job after he leaves. It works for him all the time and is a needed supplement to his work.—The Aditor.)

Sprague Electric Works calls attention to SS cable for wiring purposes.

Crouse-Hinds Company shows a unique and compact motor-starting switch housed in a condulet.

Federal Sign System (Electric) announces that the fuel administration has revoked the lightless night order.

L. Plaut & Company advertise the Four-In-One Light for use in salesrooms, offices, banks and residences.

Garland-Affolter Engineering Company advertise Pacific Coast stocks of Peerless fans and Howell motors.

J. H. Parker, Inc., typifies the high quality of Parker insulator products by a Muller type strain insulator.

The Electric Storage Battery Company has a type of "Exide" battery available for any battery power requirement.

American Electrical Heater Company details 20 features which distinguish the "American Beauty" electric iron.

Baker-Joslyn Company states that Duraduct, the original single wall flexible non-metallic conduit, is good because it's singular.

Jeffery-Dewitt Company gives seven reasons why Jeffery-Dewitt suspension type insulators should be used on high tension lines.

National Carbon Company shows that Three Pyramid brushes give an additional factor of safety in the operation of commutating machines.

The Youngstown Sheet & Tube Company urges the use of Realflex armored cable wherever flexibility and durability are essential in wiring work.

The American Conduit Mfg. Company points out the possibilities of increased wiring business made possible by Wiremold, the new metal raceway.

Landers, Frary & Clark emphasizes the timeliness of June sales of Universal electric home needs to housekeepers in general and brides in particular.

Allis-Chalmers Mfg. Company exemplifies its centrifugal pump service by a picture of a 300 cu. ft. per second pump built for the city of Memphis.

National Metal Molding Company show a picture of the University Hospital, University of California, in connection with the permanency of Sherarduct.

Freydberg Bros., Inc., a new advertiser in these columns, lays emphasis upon the adaptability of "Fastej" tape for winding armatures and field coils.

Wagner Electric Manufacturing Company states in connection with Wagner Quality motors, that the "greatest single factor in production is power dependability."

Manhattan Electrical Supply Co., Inc., advertise dry batteries which give the right kind of service.

Edison Storage Battery Supply Company shows an electric truck which has been in continuous service for eight years.

The Cutler-Hammer Mfg. Company shows four types of starters for various kinds of a. c. motors.

Pacific Electric Mfg. Company illustrates and describes a simple and effective disconnecting fuse set.

Economy Fuse & Mfg. Co. emphasize the fact that the "Drop Out" renewal link feature of their fuse has been a great business builder.

Hubbard & Company lists and pictures hot-dipped galvanized pole line hardware and Peirce construction specialties available for overhead line construction.

Detroit Insulated Wire Company attributes large Coast sales to adequate and convenient stocks as well as to the high quality of Detroit rubber covered wire.

The Hughes Division of the Edison Electric Appliance Company points out the value of the electric range load to the central station under daylight saving.

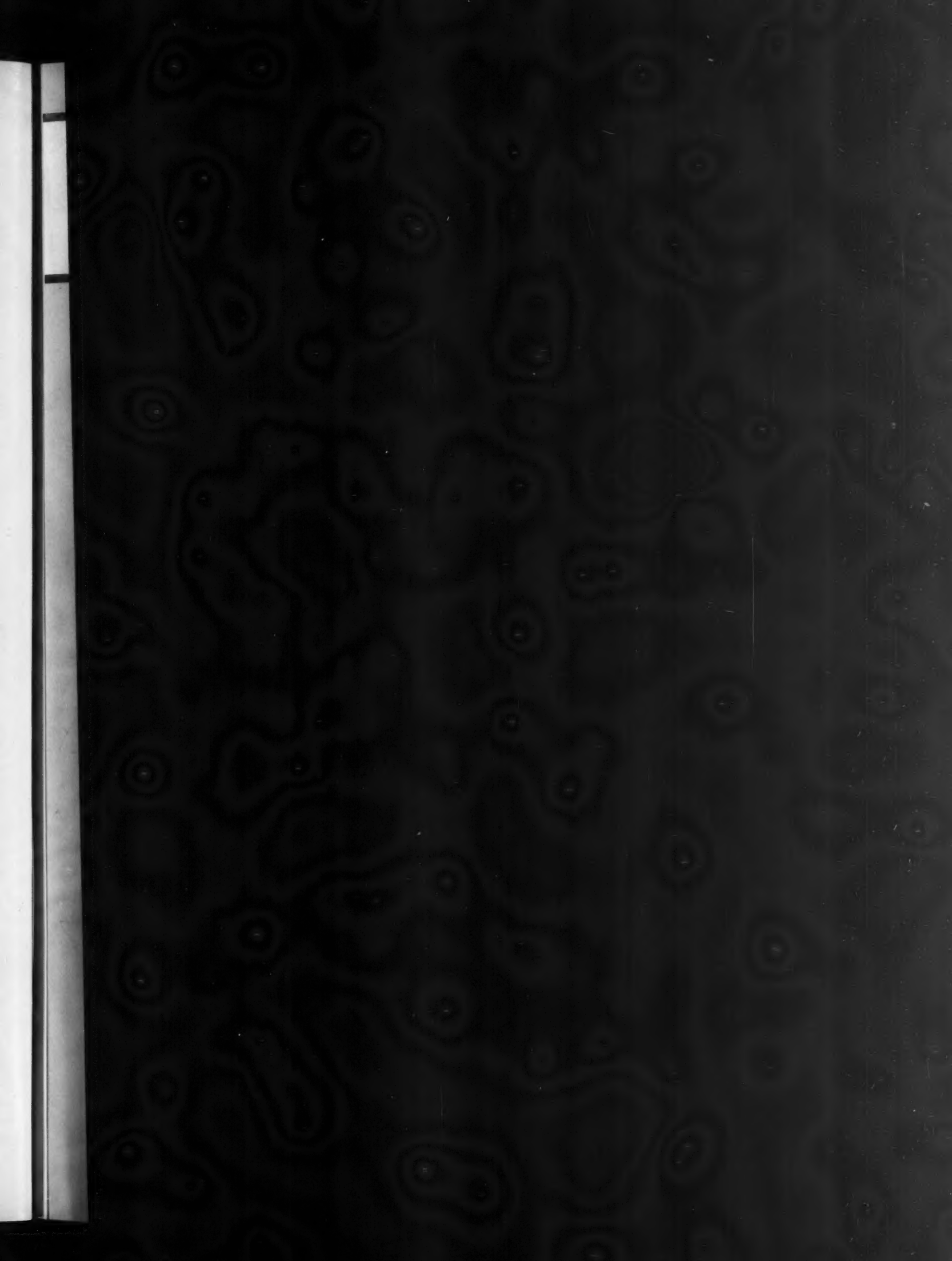
American Vulcanized Fibre Company recommends Vul-Cot Fibre as a superior product from which to make insulating cleats and other insulating parts.

Hurley Machine Company presents the Thor washing machines as a dependable product for good dealers to link up with—a money-making combination.

Condit Electrical Mfg. Company features its Type E-4 oil switches and circuit breakers for service between 200 and 500 amperes and for voltages from 4500 to 7500.

The Locke Insulator Manufacturing Company is now represented on the Pacific Coast by the Pacific States Electric Company as exclusive sales agents for Victor Insulators.

Century Electric Company employs a motor driven dough mixer to exemplify the desirability of the Century motor's heavy starting torque and keep-a-running ability.

Westinghouse Electric & Mfg. Company tells of its pioneer work with the steam turbine, whose introduction and development has marked a turning point in power house practice. It also cites the equipment of Boston cars with Westinghouse unit-switch control units and motors.

General Electric Company outlines the strong advertising campaign whereby it is aiding the dealer to sell G. E. fans. Nine distinguishing features of G. E. safety switches are given. Type R I motors are featured as the simplest, quickest and best way for meeting rush demands for small power equipment. A strong argument is also given for standard unit panels in switchboard construction.